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CARS magazine

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VOLUME 20 NUMBER 2 FEBRUARY 1977

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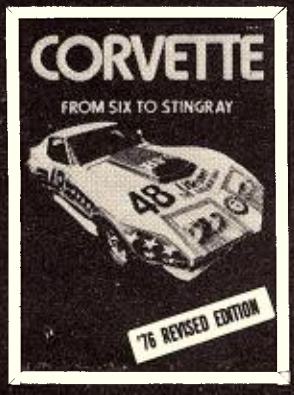

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EDITOR'S CORNER

BY RICH CEPPOS

Just thought you guys would like to know how our Project Pontiac 455 race car is coming along:

"Hello, Nunzi?"
"Yeah."
"Is it finished?"
"Is what finished?"
"The engine for the Firebird race car."
"It'll be done by the end of the month."
"Nunzi, that's what you told me last month."
"I know."
"Well, what's the problem?"
"I'm doin' it little by little."
"What's holding you up?"
"I don't have the crank."
"You don't have the what?"
"The crank."
"Why not?"
"Those guys are holdin' me up. Anyway, I can't work on the car."
"Why not?"
"It's not here."
"Huh?"
"I had to send it back."
"You had to send it where?"
"Back. To the painters. You couldn't see my name on the side. The magazine's name you could see beautiful, but not mine. So I sent it back."
"Well, when will it be done?"
"I get it back Thursday."
"When will it be ready to run?"
"Rich, could you get me a bigger carb and a different manifold? And we need a stronger transmission 'cause this one will break when I put the trick motor in."
"Nunzi, we don't have enough time for all that."
"Don't worry pal, I'm workin' on it little by little."
"When do you think it'll be done?"
"I told you. At the end of the month."
"That's what you told me last month."
"Well, it's not my fault. I didn't get the crank back."
"Goodbye, Nunzi."

WHAT CAN YOU do for a tired old car after it's nearly been beaten to death by New York City's baja-like streets and cut-and-thrust driving? You could make an attempt at reviving it by sending it off for a holiday at an automotive health spa. We chose to do just that and picked DIN Horsepower in Queens, New York, as our Shangra-La. The wizards of DIN (which happens to be the European equivalent of SAE) massaged our Colt's weary bones and nursed it back to health. They treated it to a valve job, rejetted the emissions-

(continued on page 72)

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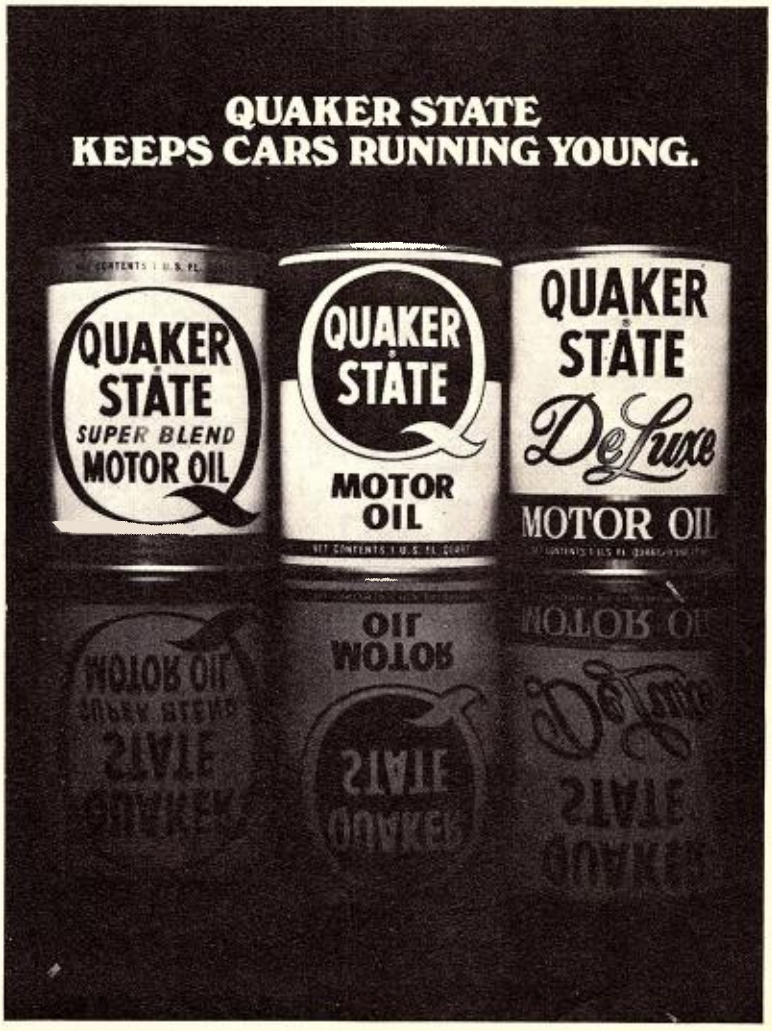

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OLDHAM

BY JOE OLDHAM

THE WORDS ARE DREADED by anyone who uses the Interstate Highway System—including me. There's nothing else with quite the finality of the signs that ominously proclaim: "There are no services on this route. Find services on crossroads."

There it is. Once you aim the front wheels down that interstate, you're on your own, brother. And let's hope you don't have cause to find out where the nearest crossroad is.

The fact is, there are thousands and thousands of miles of interstate highway in this country where you're pretty much stranded if you break down. Many of them are lightly traveled. Even on routes that are more heavily traveled, there's always the onus of getting involved. Let's face it. When was the last time *you* stopped to help a motorist that looked like he was broken down?

To some extent, the CB radio craze has helped this situation. If you have a CB radio in your car—at last count, there are about six million of us who do—you're not so alone. You can call and hope someone, anyone, is monitoring channel 9 in that area. If no one is monitoring the emergency channel, you can try calling for help on channel 19 or whatever channel is being used on that route for road information by most of the truckers and motorists.

The only trouble with the CB thing is that there are six million radios in cars these days, but about 150 million cars on the road. So what do the other poor 144 million schnooks do when they break down on a deserted interstate highway?

Happily, someone is thinking about just such an occurance and doing something about it. An outfit called Solid State Technology in Wilmington, Massachusetts, has come up with a battery-less, wireless, emergency highway communications system that just may be the best form of motorist's aid since the AAA clubs.

Solid State Technology's "Help Box" system provide what appears to be the most reliable, low-cost means available of communicating in an emergency situation. The roadside boxes contain no batteries that need to be tested, checked daily, recharged or replaced. They don't rely on power lines or underground cables that can snap or malfunction. All electronics in the Help Boxes are solid state, with clear epoxy coating. All mechanical components are solid film, teflon impregnated. Thus, no lubrication is ever needed. In other words, these units are just about bulletproof—literally. The units are virtually maintenance-free and vandal-proof.

In the event of an emergency, all you do is go to the nearest Help Box along the roadway (usually about every half-mile), pull the handle, push the button and release the handle. That's all there is to it. A tone indicates that help is on the way.

When you pull up the handle on one of these boxes, you'll see three buttons, clearly marked for police, ambulance or road service. Push the appropriate button for the type of help you require and release the handle. As you release the handle, you release the energy stored in a mechanical module which provides power to the transmitter for signal transmission. The signal goes (in 300 milliseconds) to a master receiver/decoder console at a communications center. At the console, the signal activates an audible alarm and a visual display of the box number, help desired, and time and date of call. All this information is also printed out automatically for verification and permanent record purposes. Upon receipt of the signal, the console automatically transmits a signal to the call box activating a tone indicating to the user that the signal has been received and that help is on the way.

Of course, there must be a human on duty at the communications center to alert the proper authorities as to what kind of help is needed and where. The only slip-up we can see in this system is if the guy on duty steps out for a coffee break. Other than the ever present human error possibilities, this motorist aid system looks foolproof.

One of the beauties of the system is that the user need not know his location. He doesn't even have to speak English to communicate his problem. There have been many incidents after an accident where a person is so shook up, he can't even speak. Here, all he has to do is press a button.

Right now, the Solid State Technology system is already installed along

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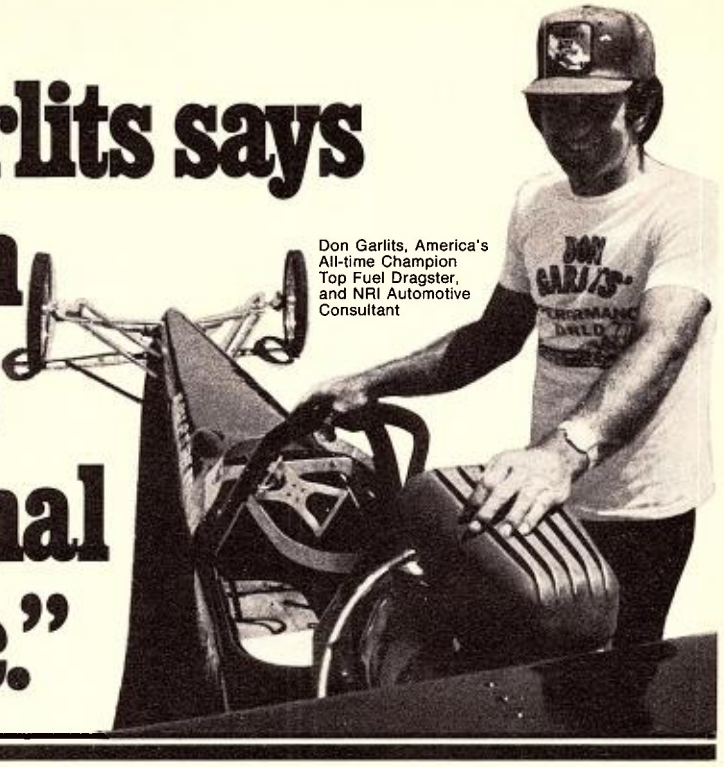
Big Daddy Garlits says "NRI can train you at home to be a professional auto mechanic."



Don Garlits, America's All-time Champion Top Fuel Dragster, and NRI Automotive Consultant

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One thing I know for sure: in good years or bad, there's always jobs a plenty for good mechanics. Anytime I see a fellow who's good with his hands, I push him towards learning how to work on cars. And the best way I know to get that kind of training at home is through one of the NRI courses in Auto Mechanics.

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HUNTINGTON

BY ROGER HUNTINGTON

IS THERE ANY LIMIT to the useful tread width of racing tires? Apparently we haven't reached it yet. Marsh's Racing Tires in Siloam Springs, Ark. is experimenting with a huge tire for circle track sprint racing that has a diameter of 36 inches and a tread width of 20! It puts more rubber area on the track than any previous racing tire—and this includes dragster slicks as well as circle track and Formula I tires. Apparently the Marsh engineers are seeing how far they can go with this business of rubber area, and still get an increase in useable traction.

Whether 20 inches of tread is too much has not been answered. The experimental tires won a heat race and placed second in the feature their first time out, at a recent spring race in Minnesota. Driver Bill Dollansky was uncertain about the benefits. Marsh's will experiment further.

SEVERAL READERS have asked about the octane rating of the special Union 76 gasoline used in NASCAR Grand National racing. I learned recently that this would rate about 104 Research, and about 98 by the Motor test method. Thus the "pump octane," equivalent to the number you see on filling station pumps, would be 101. That's pretty impressive when you realize that a pump octane of 95 is considered good these days for premium gas, and most unleaded gas rates about 87. You can run a compression ratio of 12 or 12.5-to-1 with the Union racing gas.

As an interesting sidelight on this subject, I see where Roger Penske was reprimanded recently for running the Union gas in his Formula I cars in Europe. The rules call for a "commercial pump fuel" with a Research octane rating not exceeding 100. I guess the race officials hadn't checked fuels for some time, and found several teams running over-100 Research. But Penske had the highest rating in the Union fuel: over 105 by their test. This let him run a little higher compression and more spark advance than the other teams.

All this is a sad commentary on what's been happening to commercial fuels in the last few years, due to the reduction of lead and new refining techniques. As recently as 1968, Sunoco "260" grade had Research and Motor octane ratings just about the same as Union 76 racing fuel. And you could buy it in your corner filling station for less than 40 cents a gallon. Factory-built supercars could be built with compression ratios as high as 11.5-to-1 which helped produce 350 to 400 net horses and 8-10 mpg in everyday street driving.

Those days are probably gone forever.

AT LEAST THE DAYS of 8-mpg factory cars are gone forever. I'm sure you're aware of the latest government law that calls for all car manufacturers to reach an average fleet fuel economy level of 27.5 mph by 1985. The program starts with an 18-mpg level for next year's 1978 models.

Detroit officials point out that this law will force us inevitably to smaller and smaller cars, whether we want them or not. Cutting weight and engine size radically is the only way we could meet the economy numbers. Of course, the law specifies "average fleet" economy figures. The manufacturer could build 10,000 big luxury cars that got maybe 15 mpg. But then he would have to offset this with 10,000 minicars getting over 40 mpg—in order to reach the average of 27.5 mpg for 1985. And of course he's got to *sell* those 10,000 minicars. That could be easier said than done, if the largest percentage of buyers happen to want a compact or medium size car. It could be chaos.

Detroit executives tell us we will start feeling the effects of the new law next year, when the 18-mpg fleet average must be met. The production mix between big cars and little cars will then be dictated by law, rather than market demand. Car dealers will get certain quotas of each size to sell. And they'd better be able to sell them. Further, if a buyer wants a bigger car with less fuel economy—and if millions of other buyers feel the same way—he'd better be prepared to pay an extra under-the-table price to get the car. The old law of supply and demand can't be vetoed by Washington.

One Detroit executive put it well: "1977 could be the end of an era. The last time you'll be able to buy the type and size of car you want at a straight list price."

I HATE TO KEEP harping on government regulations, but have you heard that the EPA wants to require "tinker-proof" engines in the future? They're

(continued on page 72)

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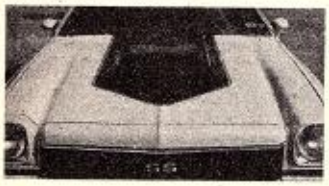

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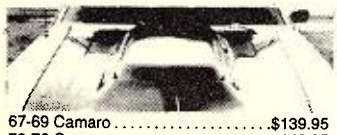

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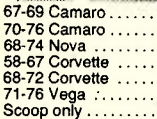


PRO STYLE HOODS

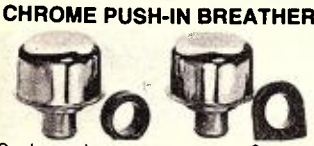
71-76 Vega ..$139.95
67-76 Camaro .139.95
68-74 Nova ...139.95
Scoop only 49.95

NEW SNORKEL HOODS

68-69 Chevelle
67-76 Camaro
68-74 Chevy II
58-62 Vette
73-75 Duster/ Scamp
All hoods $139.95
Scoop only ..$69.95

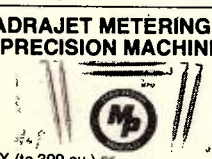
70-72 Chevelle $175.00

CHROME PUSH-IN BREATHERS



Can be used on any car .....$5.95 ea.
Spec. rubber grommet ..... .49

QUADRAJET METERING RODS "PRECISION MACHINED"



A-MPX (to 399 cu.) pr. $7.95
B-MPG (400 cu. up) pr. 7.95
C-MPGG (spec. comp.) pr. 7.95
D-Track Pak all 3 sets 19.95
E-Holley, Q-Jet Jets (state size) ....1.00 ea.

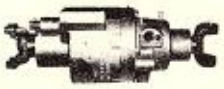
PHASE III VALVE COVERS

Chevy, Ford, & Mopar Chromed Aluminum with breathers .....$39.95 pr.
wing nuts .....99 ea.
Motion emblems (metal) .....5.00 pr.

NEW! CAMARO/FIREBIRD/NOVA ZL/FLARED WHEEL WELLS.

Dynamite looks!! Keeps your car street legal. A must for big offset wheels & X/lg. tires. Fits 67-76 Camaro, Firebird.
68-73 Nova, Front or rear (say which) cMPP75 .....$79.95 pr.
Both sets 149.95

High Performance OVERDRIVE

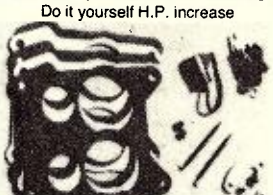


SAVE GAS!!

The way to make a performance car practical. Universal heavy duty overdrive reduces Axle ratio and engine speed 30%. Pays for itself in fuel savings and engine wear and tear. Shifts manually while moving. A must for High Performance Cars, Vans, R.V.'s Universal installation kits available $475.00

DYNA-TUNE KIT

Inc. jets, metering rods, heat spacer, spec. points, cond., curve kit, instructions.
All GM & Ford w/Quadrajet $24.95
Holley Kit 19.95
Give Carb type and # when ordering.
Do it yourself H.P. increase



PHASE III CAMARO/FIREBIRD SPOILERS

67-73 Camaro Front $24.95
67-69 Camaro Rear $39.95
70-76 Camaro/Firebird Rear $69.95
All Spoilers Bolt On

SHOW YOUR COLORS

Colorful, red, white and blue license plate. Great for street, race and show cars ..$4.95
2/for 7.95

SURE SHIFT KITS

Rework your automatic to a bang shift. Maintains automatic shifting. Extends transmission life.

Turbo 400 ....$12.88
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Torque Flight 62-73 .....12.88
Ford C4-C6 ....12.88
Vega & Pinto ...12.88

TOP CAT KIT

A must for all Pontiacs. Motion's new Topcat Kit adds bolt on HP to your 64-76 Pontiac. The kit includes Special Thin Head Gaskets, Blocked Heat Intakes, Custom Curve Kit, 8000 RPM Points and Condensor, Spec. Carb Jets and Metering Rods, Rocker Loc Nuts and Instructions $75.00

9 SEC. STREET CAR

What's needed to convert any '71-76 Vega into a 265 to 454-inch street screamer. And that means supercar performance at subcompact insurance rates and gas economy too!

V-8 KITS

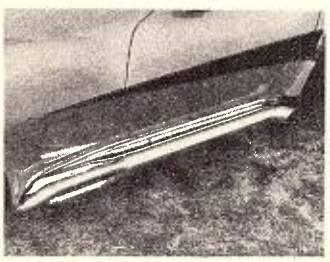
A. Super Vega Big-Block Kit $299.95
B. Super Vega Small-Block Kit $199.95
Includes Dyno-engineered headers, frame mounts & crossmember.
C. Installation Kit Deluxe (big block) $395.00
The best way to go!
(includes A. Kit plus 2 spec. front coil springs, hoses, alt. brackets, fan, pulleys & belts. (instructions)
The easiest way to do it!
D. Installation Kit Deluxe (small-block) $295.00
Includes B. Kit plus 2 spec. front coil springs, alt. bracket, fan pulleys & belts.

Motion Performance Inc. Does Professional Installations

NEW! TURBOCHARGER KITS!

Turn any low-compression engine into a street screamer with our dynamite Turbo Kits. Turbo offers 40 to 50% more available HP with a marked increase in torque (pulling power). Bolts to any four barrel intake manifold; improves fuel economy under cruise conditions. Standard model is only 4 in. higher than the top of a stock Holly carb. Some exhaust modifications (welding) necessary. NO INTERNAL ENGINE MODIFICATIONS NEEDED! A limited production option on Phase III cars. The modern way to make horsepower.
Universal Kit with complete instructions $550.00
Information package (Refundable) 1.00

SIDEMOUNT HEADERS



The real thing not cheap dummies

Small Block Vette $169.95
Big Block Vette 179.95
All Others 189.95
All Chrome add 125.00
Available for All:
55-76 Corvette
67-76 Camaro
68-74 Chev. II
64-73 Chevelle
All fit P.S., P.B., & Air, add $25.00 for smog fittings
Slip In Mufflers .....$39.95 pr.
New, Quieter Type .....49.95 pr.

RADIATORS

E. Special-HD for all Small Blocks to 300 HP $124.95
F. Super-Duty for all Big-Blocks + high hp small blks $149.95

REAR END

G. Special narrowed 12-bolt rear w/new guaranteed racing axles, REAL POSI, choice of gears. Strong enough for a Pro car bolt right in $695.00

SUSPENSION

H. Special traction bars, upper bolt on .....$39.95 pr.
I. Special traction bars lower bolt on .....$39.95 pr.
High hp & stick cars should have both.

DRIVE TRAIN

J. HD shortened, dynamically-balanced drive-shaft w/HD U-joints & yoke for stock or HD 12-bolt rear. Specify rear ..$124.95
K. 5 Lug front hubs Exchange pair ..$125.00
L. Mechanical clutch Linkage kit $49.95

NEW! MONZAGLASS

Super quality fiberglass makes your Monza look like a factory race car. Add looks, handling & styling, custom made
Front Fenders pr. $200.00
Rear Fenders pr. 175.00
Custom Front w/Spoiler 175.00
Rear Hatchback 100.00
Rear Spoiler 125.00
Custom Hood 150.00
Complete Package 800.00

NEW!! TURBINE WHEELS

The '76 look. One piece finned aluminum show car wheels. Complete, no adapter necessary. Available for most American and foreign cars and vans. Dynamite on Vettes, Mark IV's, Dealer inquiries invited.

12 x 5 (Honda, etc.) $44.95
13 x 5½ (Vega, Datsun) 44.95
14 x 5½ 44.95
14 x 7 .....44.95
15 x 7 .....49.95
15 x 8½ 54.95
15 x 10 .....79.95

NEW! WATER INJECTOR

For carbureted & turbocharged engines. Not to be confused w/vapor injectors for mileage. This unit is a must for any car/boat-engine or R.V. over 9 to 1 compression. Automatically injects water on demand to stop detonation caused by today's low octane gas. Run more timing, get more power, saves gas, easy installation. No need to richen carb or lower timing.
Complete Kit w/instructions $49.95

Headquarters for Custom Made Fiberglass Parts for 53-'76 Vettes

NEW!! 4-COLOR/2-SIDE

MOTION MAKES IT!

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T-SHIRT $3.95 EA.
3 FOR $10.00
(State Size)

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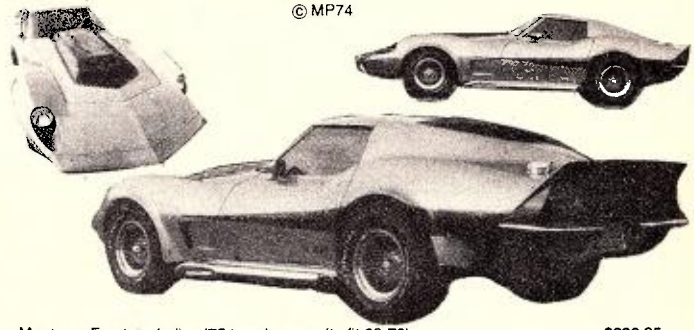
MACO GLASS - THE FINEST MONEY CAN BUY
NEW LOW PRICE! 8 x 10 Color Photo $2.00

Maco Fiberglass front (incl. cowls & inner skirts) (firewall forward)	$595.00
Maco Fiberglass rear (all glass from back of doors back)	495.00
Maco louvered rear roof section only (gives Maco look to stock back)	295.00
Maco Grill	125.00
Roof Sec. (nec. when using convert.)	100.00
Maco Emblems	10.00 ea.
Maco Headlites Assys. Pr.	100.00
Maco Deluxe Coupe Kit inc. Frt. & rear f'glass, headlights, hinges, grill. Motion emblems	1,299.00

SPECIAL DISCOUNTS TO QUALIFIED DEALERS.
EXCLUSIVE TERRITORIES AVAILABLE.

MANTARAY GT FIBERGLASS



Mantaray Front, including '75 type bumper (to fit 68-72)	$299.95
Mantaray front for all 68-76 (uses stock front bumper)	149.95
Mantaray H'light Assy. for above	49.95 pr.
Plexiglass H'light covers	49.95 pr.
New '75 type F'glass front bumper. Can be used to update 68-72 Vettes	125.00
Mantaray Hood (includes cold air box)	$200.00
Mantaray Flares (frt. or rr.) (for up to G-60 front & L-60 rear tires)	59.95 pr.
Mantaray Rear Louvered Roof	
A. For Coupe Conversion	295.00
B. For Convert. Conversion	395.00
Mantaray rear spoiler	89.95

LEMANS MIRRORS

New non-remote type 10 min. inst ....$29.95 pr.
Left Remote ....$39.95 pr:

SEBRING MIRRORS

L Remote .$39.95 pr

NEW! PHASE III STEERING WHEELS

Custom Leather grain wheel. Used on Motion Mantas and Macos. Bolts on, includes adapter and horn button. Silver or Black Spokes. Fits most American and Foreign Cars. $54.88

NEW! RIVIERA BACK

Fits 68-76 Vettes-greatly increases rear space. Fantastic styling $695.00

NEW! SHARK FRONT

Fits 68-76 Vettes. Moves headlights into grill. Gives '75 look to 68-72 cars $249.95
Same w/mantaray Lites 299.95

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Custom Show Lites, a must for your show car. Has High/Low beam .....$89.95 pr.

PHASE III 63-67 VETTE

Complete Tilt Shark Front $595.00
Custom Shark Front (plc.) 149.95
Custom Front Grill 49.95
Custom Rear Spoiler 59.95
Flared Wells (Frt. or Rr.) .....39.95 pr.
X/Lg. ZL-1 Flares (Frt. or Rr.) .....59.95 pr.
'67-427 style hood 124.95
L/88-ZL/1 style hood 124.95
Our new catalogue has replacement fiberglass for '53-76 Vettes.

ZL/1 VETTE FLARES

NEW! Ultra wide fenderwells provide clearance for up to N-50 tires & Xlg. wheels. Available for 63-76 Vettes Front or Rear .....$59.95 pr.

NEW PHASE III ZL-1 HOOD

Exclusive Motion design cMPP 74 eliminates the unsightly and troublesome wiper door and grill assy. on 68-72. Uses stock hinges and hatches. Fits all 68-76 Vettes.
New ZL/1 hood $179.95
Hood w/4 bbl. Cold Air Pak 199.95

NEW CAN AM VETTE PARTS

Outta sight new glass for 68-76 vettes makes your vette look like the ultimate factory racer. Fender wells take up to 10" front & 14" rear tires.
Front wells ....$119.95 pr.
Rear wells .....195.95 pr.
Plexi Covered Headlights ....89.95 pr.
Can Am Rear Spoiler 225.00
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NEW QUAD LITES

Update your 68-76 Vette to the new Monza look. Headlites still retract.
Complete Lite Kit $129.95

NEW!! PLEXI SUPER TOPS

New Removable formula L-7 tops in red, green, dk. & lt. blue, amber, smoke, grey, yellow, brown and clear. A color compatible with every Corvette. 229.95

CUSTOM VETTE FRONT SPOILERS

Bolt on HD Fiberglass
63-67 Street $39.95
63-67 Lg. Trans Am 49.95
68-72 Street 39.95
68-72 Lg. Trans Am 59.95
73-76 Street or Race 59.95
Not cheap plastic

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New! All aluminum kit. Fits all '68-76 Coupes. Fast, easy installation, includes chrome hardware Removable for cleaning.
Custom Kit $129.95

NEW VETTE PLATES

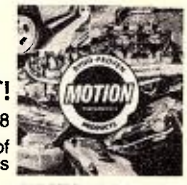
The finishing touch Black with raised chrome letters.
Corvette Plate .....$5.95 ea.
custom L/88, L-S7 L-T1 or Motion Corvette Plate .....$8.95 (say which one)

GT GAS CAP

GT Vette, Lemans-Type Cap w/vette adapt .$49.95
Reg. Lock cap 9.95
10 min. installation time

BRING YOUR SPECIAL CAR TO US FOR SERVICE

Catalogue ...Send $1.00



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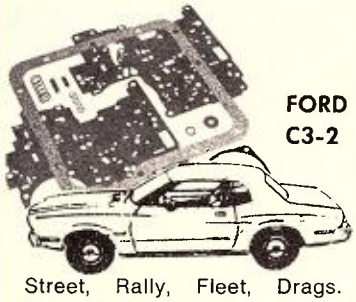
Unequalled Shifting Performance
STREET OR STRIP
EVERYDAY CARS
Automatic Transmission Re-Programming Kits



FORD C3-2

Street, Rally, Fleet, Drags. This kit offers high performance along with much greater durability. Gives greater control of your transmission but still allows you to shift either manually or completely automatic. Allows shifts to happen quickly at the correct time.

TORQUEFLITE ALUMINUM CASE TF-3

This kit is truly "Instant Full Race", and the durability is doubled. You get maximum performance shifts and back shifts when you want them, as well as automatic shifting in "D" position, with comfort at low speed.

TransGo Kits install easily without special tools. No need to remove transmission. Complete pictured instructions with each kit.

At your dealer or send $1.00 for catalog. Inquire about other TransGo Kits available.

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CHEVY

PAUL WITHERS
Withers Automotive, Inc.

Send questions to CHEVY, c/o CARS Magazine, 420 Lexington Ave., Room 2540, New York, N.Y. 10017.

Q. I have a '69 Chevelle SS 396 with 4.11 rear, Crane cam kit (290-degrees duration, 5.68 lift) and hydraulic lifters. Will I have any piston-to-valve clearance problems with this cam? Ignition is via an Accel competition distributor with optional timing retard kit. I would like to recurve my distributor. What setting should I use? What do you think of the Weiand hi-rise manifold No. 7505 and Holley 850-cfm double-pumper No. 4781 intake combination? The car is run street/strip.

Bob Valine
Pittstown, Pa.

A. Definitely check the piston-to-valve clearance when using a .568 lift cam if you are using stock pistons. Unless the cam manufacturer states that the cam will clear stock pistons, always check piston-to-valve clearance.

Set your distributor for 12-13 degrees distributor advance (24-26 degrees measured at the crankshaft) with an initial advance of 12-14 degrees BTDC for a total advance of 36-38 degrees. If you want to use the retard setup at the track, bump your initial timing up 2-4 degrees and adjust the retard kit so that it retards the timing back to 36-38 degrees in high gear. In other words, when you come off the line, your total timing will be 40-42 degrees. When you shift into high gear, flipping the retard switch will drop your timing to 36-38 degrees. The quality of your gasoline is critical with high total timing. Use a fuel additive or racing gasoline to prevent detonation.

Your selection of carb and manifold sound fine although an 850 double-pumper on the street will require frequent pit stops at the local gas station for refills.

Q. I own a 1970 Chevelle with a 350/300 hp bored .020 over with stock pistons, cam, etc. The car's equipped with flex-fan, Holley 780 Torker manifold, Doug Thorley Headers with Corvair Turbo-mufflers, recurved stock distributor (full advance 2500 rpm) Accel chrome coil, 4-speed, 4:11 zoom gears, and TRW trac-bars. My car's low end is great but I want more top end performance. I was told that a 350-350 stock cam would work well. I don't want an aftermarket cam. What do you think? Also, would I have to install new valve springs and lifters? Would I lose any low end?

Nick A. Politis
Astoria, N.Y.

A. I would recommend a G.M. No. 3863151 camshaft and G.M. No. 5232670 lifters. Always use new lifters when you install a new camshaft. Your stock valve springs should be adequate. With a 4.11 rear the loss in low end power should be negligible.

Q. I recently purchased a 1972 Nova with a completely stock 350 2-barrel engine. I'm planning to buy headers and a moderate sized 4-barrel and manifold combination. What I want is this: good, strong acceleration but not to go broke paying for it. What can you suggest? Also, since the engine came with a small 2-barrel carb, will I have any problems with my cam or heads? Will I have to alter anything else to make this switch?

K. Kochman
Las Vegas, Nev. 89108

A. Use a manifold such as the Edelbrock Streetmaster or the Holley Street Dominator. Use a spread-bore type carburetor (for example the 650-cfm Holley R-6772). Spread-bore carburetors are the hot tip for good performance and fuel economy. This combination should work very well with the stock components in your engine.

Q. I have a 1964 two-door hard top Super Sport Chevy. I have a chance to purchase a Chevy big-block from a friend and would like to put it in my car. Is this application possible and, if so, what important factors should I know before attempting to do this? Will the fact that my car has a two-piece driveshaft cause any problems with a Chevy big-block? Would I have any problems with my front end because of the weight of this engine? Would it be necessary to change anything in my front end to support my engine and

(continued on page 72)

267302* JESSI COLTER Diamond In The Rough
267948* GEORGE JONES & TAMMY WYNETTE GOLDEN RING
265496 Electric Light Orch. OLE-ELO
264499 FERRANTE & TEICHER PIANO PORTRAITS
252718* PETER FRAMPTON FRAMPTON
231084 CHARLIE RICH Behind Closed Doors
263814* LEE OSKAR BLT
260257* SHIRLEY BASSEY Good, Bad But Beautiful
222406 MAC DAVIS BABY DON'T GET HOOKED ON ME
236678 TONY ORLANDO & DAWN GREATEST HITS
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259796 JOHNNY MATHIS FEELINGS
246942 NEIL DIAMOND SERENADE
265678* The Alan Parsons Project TALES OF MYSTERY & IMAGINATION
256560 CAT STEVENS GREATEST HITS
262071 MANTOVANI THE GREATEST GIFT IS LOVE
257402 GLEN CAMPBELL RHINESTONE COWBOY
268110* Ozark Mountain Daredevils Men From Earth
253005* JANIS IAN Between The Lines
208868 Johnny Cash Portrait Greatest Hits II
263582* SONNY JAMES 200 YEARS OF COUNTRY MUSIC
267930* MARTY ROBBINS EL PASO CITY
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268490 HELEN REDDY MUSIC, MUSIC
267500* WAR'S GREATEST HITS
265256* NANCY WILSON This Mother's Daughter
265918 CARPENTERS A KIND OF HUSH
265983* Charlie Daniels Band Saddle Tramp
266619* CONWAY TWITTY HIGH PRIEST OF COUNTRY MUSIC
266478* JOHNNY CASH AND THE TENNESSEE THREE ONE PIECE AT A TIME
264390 LEONARD BERNSTEIN NEW YORK PHILHARMONIC Tchaikovsky Symphony No. 4
268185* Earth, Wind & Fire SPIRIT
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266049* STEVE MILLER BAND FLY LIKE AN EAGLE
266403* CHARLIE RICH'S GREATEST HITS
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267831 THE BEST OF BACHMAN TURNER OVERDRIVE
267310* MERLE HAGGARD MY LOVE AFFAIR WITH TRAINS
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MOPAR

BY JOE JILL
President, Speedwin Automotive Engineering

Send questions to MOPAR, c/o CARS Magazine, 420 Lexington Ave., Room 2540, New York, N.Y. 10017.

Q. I have a 1975 Plymouth Duster with a 360 high-performance motor equipped with a Carter Thermoquad and 3.21 gears. I would like to know what I can do to make this car a decent street racer. I have already installed Hooker headers and would like to know what gear ratio to use. Is the Chrysler purple shaft, part number 3690213 camshaft a good choice for this car? Could you tell me what jets to use for the ThermoQuad, what my advance should be and how to set the electronic ignition up for this particular distributor. Also, will the car give decent mileage and be manageable on the street?

Eric Shiigi
Hilo, Hawaii

A. The first thing to do is change the rear gears to 3.90 or 4.10. The No. 3690213 camshaft is a good all-around camshaft but I would recommend changing the intake manifold to either the LD-340 or the Offy Port-O-Sonic. Both of these manifolds are good choices and there are sufficient carburetor modifications that go with each manifold. You will probably be better off (and there is less work attached) if you use the LD-340. The carburetor modifications necessary are: primary jets .095, secondary jets .149, idle feed restriction .035, and metering rod No. 1962. Drill the accelerator pump shooters out to .040 and check float level. When you modify the carbureator and change the camshaft, you will get good power but gas economy will be marginal. The distributor modification will help get back some of the economy. Build 10 degrees in at 1000 rpm to give you 20 degrees at 2000 rpm crankshaft. Use a total advance of 36 degrees to come in at 2100 rpm. This should make the car a good street and strip runner with good power.

Q. I have a 1969 Chrysler with the 440 magnum engine, auto trans., and 3.91 posi rear. I am going to get the engine rebuilt and will use a Racer Brown SSH-25 camshaft and kit with 286 duration and .485 lift. Will I have enough clearance between the stock pistons and the valves? If not, what do you suggest? Also, I would like to use an older factory dual quad manifold (No. 1854817-1) which I have. It was designed for engine speeds over 5000 rpm. I plan to use the car for street use only and want strong torque at about 2800 rpm. Are there any carburetors I can use with this manifold to end up with maximum torque output at a street-useable rpm? Also how should they be set up?

Charles Painter Jr.
Pasadena, Tex.

A. The Racer Brown SSH-25 camshaft's piston to valve clearance should be sufficient but as a rule it should be checked. In our experience there has been no problem with clearance in most applications where the heads have been milled. The manifold recommended is the Edelbrock Torker with a No. 3310-1 Holley carburetor. This is a good combination for the range you want to use(2800 rpm). Using a manifold that is for speeds over 5,000 rpm in the street with the Racer Brown SSH-25 camshaft is the wrong combination.

Q. My 1970 Plymouth 'Cuda 340 leaks a quart of oil every 200 miles. The worst leak is between the front of the intake manifold and the block. For some reason there is a lot of pressure under the valve covers because oil is collecting on top of my aluminum covers. I have changed intake manifold gaskets, valve cover gaskets and the rubber grommets for the oil breather and PCV valve but there is still oil everywhere. The oil leak started after I had a valve job. The heads were milled to clean them up so the intake manifold was not milled. The manifold appears to fit after all the bolts go into the holes so it cannot be too far off. Any suggestions would be gratefully appreciated.

Richard Terhune
Brunswick, Me.

A. Having your heads milled (you do not say how much was taken off) cause your problem of oil leaking between the manifold and the block. On a 340, for every .010-in. you remove from the head, .0095-in. must come off the intake manifold surface. Otherwise, you will get a wrong crush on the end rail gaskets–resulting in a poor fit and an oil leak. If you have aluminum valve

covers, unscrew the breather cap and look into the hole. If there is no baffle, that, check for an intake manifold leak or a leak under the carburetor base and fabricate a baffle so oil hits the baffle before it hits the breather.

Q. I have a 1968 Plymouth GTX 440 six pack with a Racer Brown SSH-25 cam and stock 1969 tri-power manifold and carburetors. The engine doesn't seem very happy idling below 900 rpm. It will idle at 750 rpm but then stumbles when easing off the line. Would a high stall converter allow the engine to idle higher, yielding better slow starts without heavy brake pressure? Also, is there a special motor mount available for this car, without going to steel ones, which would give me better insurance against a wandering engine?

Christopher Allen
New York, N.Y.

A. You should be able to idle your engine with the Racer Brown SSH-25 cam at 750-800 rpm with no problem whatsoever. If it does not want to idle below that, check for an intake manifold leak or a leak under the carburetor base gasket. If that checks out okay, open up the center squirter to .033-in. This will give you a better pump shot when coming off the line hard. Make sure your distributor curve is coming in quick; that is, you need 36-37 degrees total at the crank all in at 2000 rpm. Accomplish this by building 10 degrees in your distributor at 1,000 rpm with 16 degrees initial lead at low rpm (under 500 rpm), then re-adjust the idle to 800 rpm. This alone will definitely get the car to accelerate hard without any bogging. Next get a B&M Hole Shot coverter. With the SSH-25 cam that should be enough converter for you coming off the line hard. If you are experiencing torque steer (that is, the car coming out and driving to one side with the engine moving excessively in its mounts), you can cure this by putting a strap from the left side of the head to the left side chassis—a ¼ inch strap will do it.

Q. I have a 1973 Duster with a 318 engine, and a set of 2.02 340 heads. What can I do to make them work on my 318? I don't want to notch the block but I am willing to replace the necessary parts. For the past year I have been collecting parts to help the performance. I have an Edelbrock High Rise, 600 AFB carb, a set of headers and a 4-speed transmission. Do you have any other suggestions that will increase performance and yet still enable me to drive it back and forth to work?

Greg Jenkins
Glendale, Ariz.

A. The 340 heads will bolt on your 318

(continued on page 74)

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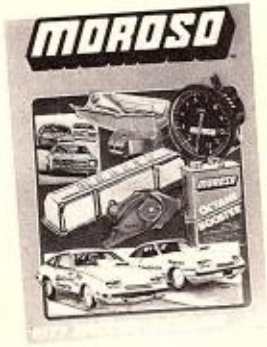

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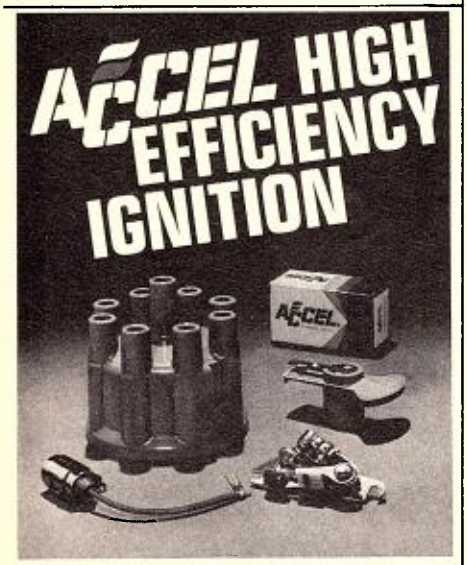

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BY NUNZI ROMANO
President, Nunzi's Automotive

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Q. I recently purchased a set of 3.73:1 rear-end gears from one of my friends that was previously installed in his '75 Tempest. Having the same type of car, I figured this would be a real simple bolt-in operation. When I removed my gears, I noticed the ring gear from my car was much larger than the one that I brought from my friend. What gives? Is this some kind of special rear-end assembly?

Brad Dellman
Schenectady, N.Y.

A. Your car is equipped with an 8⅞-in. rear-end which Pontiac Motor Division saw fit to install on all Tempest wagons and on the Grand Prix. This baby is also found on most body Pontiacs as well as on a few Tempest sedans. This particular setup can be identified by the 8⅞-in. diameter ring gear, a drain plug on the rear cover and heavier 31 spline axles.

Q. This may sound crazy but I need some specs on a family heirloom that has recently been handed down to me from my brother. The heirloom is an original Pontiac McKeller No. 11 camshaft which has been in my family for nearly 15 years and never used. No one seems to know the specs for this cam which I intend to install into my Pontiac bracket racer.

Lamar Staple
Philadelphia, Pa.

A. The McKeller No. 11 was one of Pontiac's more potent cams developed for the early Super Duty Catalinas back in '62. The intake opening and closing figures are 44 degrees BTDC and 88 degrees ATDC respectively with the exhaust opening at 97 degrees BTDC and closing at 47 degrees ATDC. Intake duration is marked at 312 degrees with the exhaust set at 324 degrees. Overlap is 93 degrees and lift with 1.65:1 rockers is .447-in. The valve lash should be set with the intakes at .010-in. hot or .012-in. cold with the exhaust .015-in. hot or .018-in. cold.

Q. I have a 1974 Trans Am with a 455 SD and a 1⅞-in. JR Headers connected to my stock exhaust. I'm interested in using the 1.65:1 ratio rocker arms. I have the Pontiac rocker arm kit. The problem is that the larger diameter pushrods are longer than my stock pushrods. Would my stock pushrods be strong enough? Do you know of a kit that has the larger diameter pushrods at the correct length? Would my stock hydraulic lifters handle the increased ratio? Lastly, how tight should the new rocker arms be?

Tom George
Ont., Canada

A. There is no problem using the stock lifters with the 1.65:1 rocker arms although we do recommend the use of 7/16-in. screw-in studs in place of the stock units along with locking rocker nuts. You may also use your stock pushrods with this setup. The simplest way of adjusting the rockers is to do one at a time. With the engine running at slow idle, loosen one adjusting nut (this system will not work with stock Pontiac rocker nuts) until the rocker starts to make a clicking sound. Then tighten it until the sound disappears. Some people prefer to go a quarter of a turn more but we have found good results at stopping when the clicking does. If you intend to use the stock Pontiac rocker nuts, simply tighten them to 20 pounds or until torque is reached with the engine hot. But this is not the way to go for performance applications.

Q. I own a '64 Buick Skylark in which I have installed a Pontiac 360 hp 400 Ram Air. I put in GTO motormount brackets, a turbo 400 with short tail housing, a Chevy yoke that matched the original driveshaft, added headers to fit a '64 GTO (same frame) and a GM 10 bolt posi. It all seems to fit quite well—all except the oil filter. Even the short can sits right on the frame. What can I do? I'd like to know if this swap is workable as I haven't run the car yet.

Steve Sanders
Anchorage, Ala.

A. Use oil filter housing from a '64 or '65 GTO or Tempest No. 6435377. This housing will locate the filter closer to the oil pan out of the way of the frame.

Q. In your September 1976 *Pontiac Performance Annual* No. K49546 you stated that you still can purchase a

(continued on page 72)

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BY DILBERT HORATIO FARB

Dear Dilbert,
I recently read in *Popular Science* that any 10-year-old kid can change a set of shocks. I am 32 and I just tried to install a set of shocks on my '73 Olds Cutlass. After four hours of knuckle-busting work, the shocks still weren't on. Is there anything wrong with me?

John Wilson
San Diego, Calif.

Not really. The problem is that all 10-year-old kids who read Popular Science *have degrees in mechanical engineering.*

Dear Dilbert,
Does anybody make a lifetime spark plug?

George Balakier
Chicopee, Mass.

This is absolutely the last time I'm going to answer a "lifetime spark plug" question. There is no such thing as a lifetime spark plug, unless you're contemplating suicide shortly after you install them. This is the biggest rip-off ever perpetrated on the American public. Lifetime spark plugs are a fraud. Period.

Dear Dilbert,
I want to buy a new van but I only want to spend $3000. Is this possible? I want air conditioning, too.

Ian Keueher
Portland, Ore.

Sure it is! First rent a time machine for a buck and then set the dial for 1965. You're living in a dream world, Ian.

Dear Dilbert,
I'd like to buy a set of quartz-halogen headlights for my car, but I'm told they're illegal. Is this true?

Norman Bentley
Glens Falls, N.Y.

Yes, they are illegal in most places, even though they work ten times as good as sealed beams. The people who make sealed beams maintain a big lobbying effort in Washington and in the various state capitols. That's why they're illegal. It's the American way of doing things—in other words, political payola.

Dear Dilbert,
When I bought a Triumph TR7 a year ago, I built one of the garages like you see in the television ads to fit the car exactly. I recently sold the car. Is there any other car that will fit in my garage?

Bob Keller
Warren, Vt.

I'm sorry, Bob. I'm afraid you're stuck with the shape of things to come.

Dear Mr. Farb,
What kind of car does Jimmy Carter drive?

Gene Dixon
Atlanta, Ga.

I don't know, but I'll bet it costs him peanuts to run.

Dear Dil,
Is Don Garlits going to get back into drag racing?

Mort Duryea
Buffalo, N.Y.

Is the Pope going to stick with religion? I never knew he left.

Dear Dilbert,
I've been driving for 62 years and I think that the old cars were safer than the new ones. What do you think?

Byron Jones
Chicago, Ill.

Are you kidding? The Model T Ford had window glass in the windshield. The brakes on old cars were awful. Windshield wipers were sold as optional equipment. And you say they were safer? Everything in the past always looks rosier, pops. Some people remember World War II with fondness.

Dear Dil,
My girlfriend won't marry me until I quit drag racing. What should I do?

Abbott Karl
Minneapolis, Minn.

Quit your girlfriend. From the way she sounds, after you're married she'll try to regulate your breathing.

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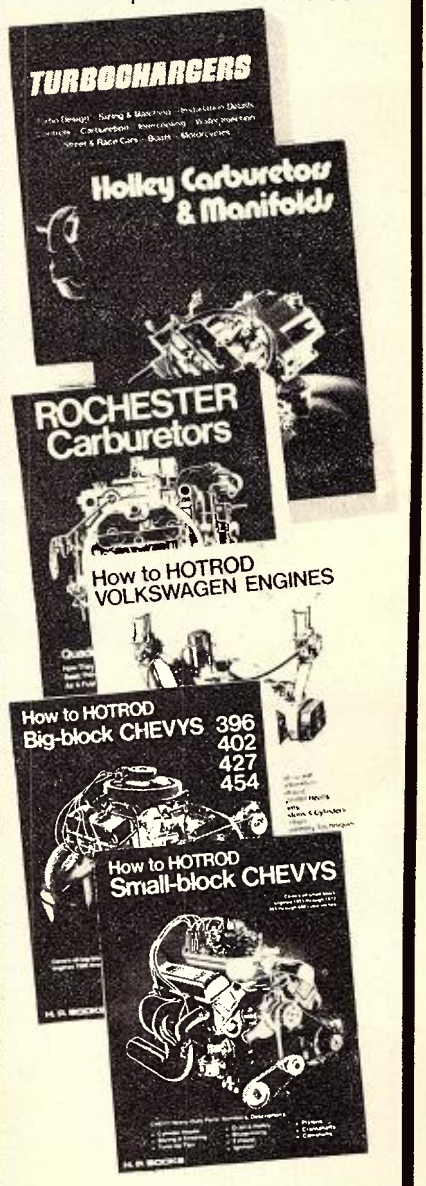
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NEWS and INFO

CONNOISSEUR'S CAMARO

Bob Sharp, nationally renowned sports car racer and entrepeneur, has announced plans to assemble and distribute through selected Chevrolet dealers a special Camaro road version, patterned after a series developed by the late Mark Donohue. Exceptional stability and handling, coupled with tasteful styling, are the hallmarks of Sharp's limited edition Chevrolet.

The project is headed up by Sharp's Special Vehicle Development Manager, Bill Mitchell, himself a former National Champion sports car racer, who engineered the original series with Donohue. Sharp said, "Mark and Bill took an approach to this assignment parallel to the thinking behind our GT-33 Datsun "Z" cars, a 'pavement up' handling package, not the usual cosmetic or 'muscle car' treatment. This Camaro handles just about as well as any road car I've driven, actually better than some pure racers".

Bill Mitchell outlined Mark Donohue's objectives in the original project as "the creation of a 'total driving package,' capable of responding to the reflexes of really serious drivers. The car was designed and engineered to compare favorably with Europe's most respected—and expensive—nameplates. According to *Car & Driver's* Pat Bedard, that is exactly what we accomplished."

Typical of the thoroughness for which Bob Sharp is noted, a trait shared by Mark Donohue and Bill Mitchell, no item affecting handling is overlooked in the transformation of the Camaro—even the front seats, steering wheel, and horns are replaced with components that contribute to more positive response and better communication between the driver and his machine. Shock absorbers, anti roll bars, wheels and tires are all replaced with what Sharp considers the finest equipment currently available. He credits Bill Mitchell's engineering prowess for making the end result "greater than the sum of its individual parts."

Now, for less than $10,000, thanks to Bob Sharp, Mark Donohue, Bill Mitchell—and maybe your local Chevrolet dealer—you can own one of the world's finest road cars.

CONGRESSIONAL SMOG-BIND

The government is forcing the auto industry to the possibility of cancelling its 1978 model production. This will occur if the new Congress does not revise vehicle exhaust emission standards next year, the vice chairman of General Motors Richard L. Terrell has warned. The requirements still in effect for 1978 models are "so close to zero emissions that our present catalytic converter systems can't meet them," he said.

As a practical matter, GM really has only one possible course of action now that Congress has adjourned without enacting feasible auto emission standards for new cars scheduled to go into production next summer. "We are continuing the testing and procedures to certify our 1978 models at the same emission standards—the same tough standards—that apply to 1977 models, hoping that the new Congress will be more responsive to the problem."

Mr. Terrell pointed out that both houses of Congress had voted for bills which would have continued 1977 standards for at least one year "so we believe our decision to design our 1978 models to those standards conformed to the intent of Congress. We made this decision in good faith and we informed Congress and its leaders on several occasions as to what we were doing.

"The EPA certification procedures require many months to complete. We have to hand-build hundreds of prototype cars and drive them for millions of miles of testing," he explained. "Therefore, we had to decide the final engineering specifications for our 1978 models and begin this process several weeks ago. The EPA cannot certify these cars—and of course, we will not build them—unless Congress changes the standards.

"This dilemma is not of our making," he added. "It was not the auto industry that defeated the legislation before Congress. Our industry has been urging action for years." He said the bill died because it was held back from consideration in the House of Representatives until shortly before Congress was scheduled to adjourn, and because of a Senate filibuster directed at other provisions not related to automobiles.

NEW LUCAS ELECTRICS

Almost simultaneously, Lucas Industries of Birmingham, England has introduced four new electric vehicles. They are the Lucas Electric Limousine, the Lucas Chassis/Cab Prototype, the Lucas Electric Crewbus and the Lucas Electric Taxi (Phase Two).

The Lucas Electric Limousine is a luxury personnel

carrier which seats seven plus a driver. Based on the well-tried design of the General Motors Bedford CF Van, it has been modified to carry the electric drive system and battery packs in such a way as to avoid intrusion into the cargo area, permitting the same volume capacity as internal combustion engine powered versions.

These features, plus suspension, drive and brake systems are shared with the Lucas Chassis/Cab Prototype and Lucas Electric Crewbus which are also based on the Bedford CF Van. They also share the advanced low-friction transmission, developed for the Lucas Electric Taxi and a repositioned battery pack tray suspended at three quick-release points beneath the vehicle which greatly improves access and seating.

Projected range of these silent, pollution-free vehicles is between 70 and 140 miles, according to usage, on a single charge with top speed in excess of 50 mph. They won't be neck-snappers, with 0-30 mph acceleration time approaching 14 sec (fully loaded) and 30-40 mph acceleration time of approximately 10 sec.(fully loaded).

In the Bedford CF-based prototype the units making up the battery pack are carried in a rectangular stainless steel tray which is suspended from three points on the underside of the vehicle bodywork by means of quickly detachable couplings. Electrical connections to the battery are made by a plug and socket which, in later versions, will mate and disconnect automatically when the battery tray is fitted to, or removed from, the vehicle. The complete battery in its tray is removed from below the vehicle using a jacking platform which can be wheeled under the vehicle and raised or lowered as required.

With a top speed of approximately 60 mph, a range of around 100 miles on a single charge, and rapid recharging by battery exchange, the Lucas electric taxi suggests how the distinctive image of the cab might evolve in the last quarter of the century.

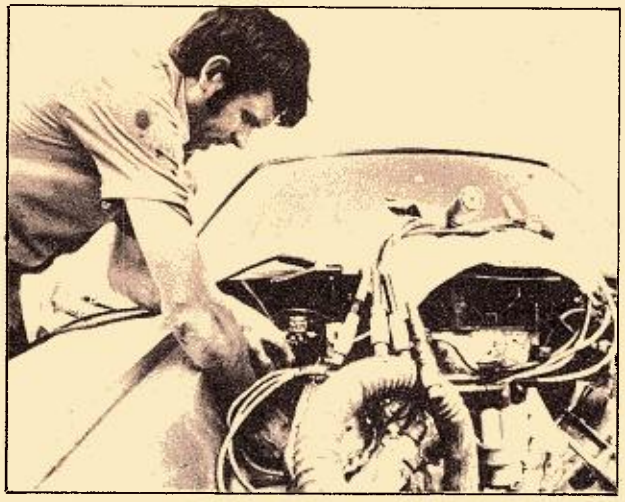
There are a number of factors in its favor. It is relatively inexpensive to run. The fuel cost for electricity is a fraction of the cost of diesel oil (although battery replacement cost must be taken into consideration). Generally, battery-electric vehicles require less maintenance than their diesel or gasoline-engined counterparts. Taxi duty, with a good deal of stopping and starting, particularly suits the electric vehicle. The Lucas electric taxi wastes no energy when it is stopped in a queue of traffic.

GLIDDEN WORK-HORSEPOWER

Thomas Edison took the words right out of Bob Glidden's mouth when he said: "Genius is one percent inspiration and 99 percent perspiration." Thoroughly dominating the Pro Stock class of the International Hot Rod Association's Winston Challenge series this year, Glidden has proven his genius and reaped the benefits of another championship season.

"People try to come up with all sorts of reasons why we're winning, but the real reason is hard work," says Glidden, who has captured an incredible eight triumphs in nine IHRA national events thus far this season. Only a second place finish at the Summer Nationals has blemished his enviable record. "We sometimes work 16 hours a day, seven days a week. The breaks have come our way over the past three years, but we feel like we've worked hard for whatever we've accomplished," adds Glidden, nodding in the direction of his wife, Etta.

"We enjoy working together," says Etta, who seemingly spends as much time as her husband poking her



head under, over and around the race car. "I'd rather be doing this than housework any day because it's not as boring, not the same thing day after day. Every week it's something different—different people, different places."

Relying on an abrasive bar of Lava instead of a soft soap, however, does have its drawbacks for Etta. "People are so used to seeing me with grease and oil all over me that they don't recognize me otherwise," she says. "Bob and I went to a banquet one night and some people who came over to talk to him kept giving me funny looks. They thought Bob was with another woman."

"Etta takes the place of two good people," Bob praises. "She is a partner, a crew chief, a business manager and a morale booster."

For the Gliddens, there is only a brief respite when one event ends and another looms just around the corner. Between races they retreat to their shop here where Bob sets about to mechanically groom his engines and Etta catches up on making a home for him and their sons.

In the not-too-distant future, Bob Glidden Race Cars will move its operation into a spanking new $250,000 facility in nearby Whiteland. The Glidden family will move into a new home there, also.

"We do as much as we can to maintain the car with other people that work for me back at the shop," says Glidden, "but when we go on the road, it's just Etta and me most of the time."

The pair has done incredibly well on the road. Only Ford rival Wayne Gapp has been able to stop Glidden and that narrow setback came in the finals of the Summernationals in Milwaukee over the Fourth of July weekend. The other eight events, though, belonged to Glidden. He has assured himself of the IHRA Pro Stock championship which carries with it a $5,000 bonus from the R.J. Reynolds Tobacco Company. Also, he has all but assured himself of another $15,000 from Winston as the International Pro Champion.

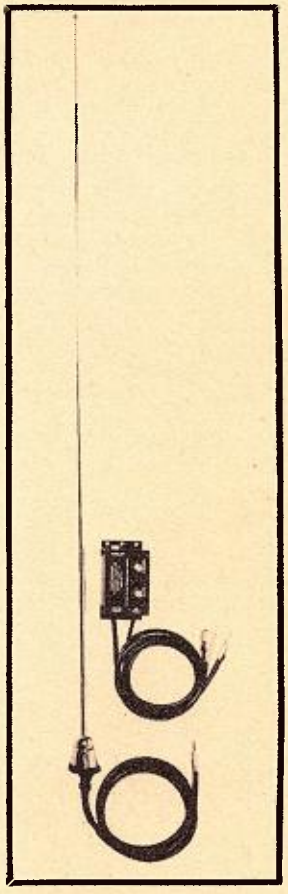
"Winston has really made it more worthwhile for the racers," says Glidden, who has been in the sport for 10 years. "Drag racing could use a lot more non-contingent sponsors like them. It would help to promote the sport and we need that."

As two-time reigning world champion of the National Hot Rod Association, Glidden is personally involved with helping to promote the sport. His Pinto, boasting proudly the No. 1 Pro Stock marking, is a constant attraction to fans roaming the pit areas and Glidden takes time when he can to talk racing to those in-

(continued on page 71)

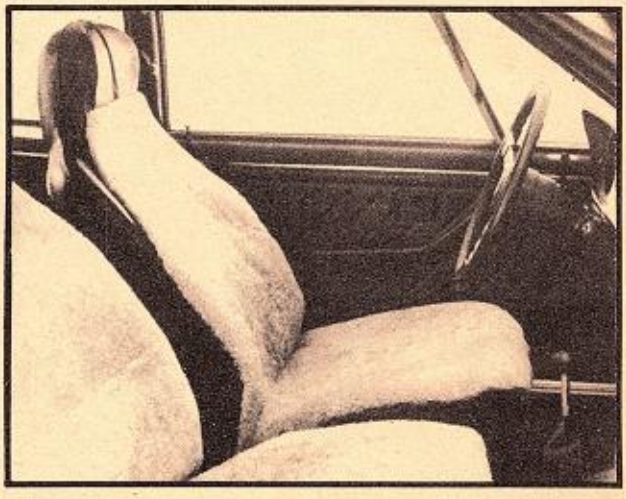
New Products

LIL' FOOLER
"The Little Fooler", the new AM/FM/CB antenna by Anixter-Mark, deters theft simply because it doesn't look like a CB antenna. It looks like an ordinary three-section telescopic antenna that extends from 22 to 57 in. This disguised CB antenna also delivers unique performance. It transmits and receives CB simultaneously with AM and FM. There is no distortion or loss of reception on the AM/FM band while punching out a clear CB signal. "The Little Fooler" covers all the channels on the CB band, plus easy coupler adjustments allow new channels to be tuned-in (VSWR of 1.2 to 1 on any of the 40 channels.) The complete assembly includes "out-of-sight" universal mounting coupler, high quality coaxial cable with connectors and easy-to-mount cowl antenna. Contact Anixter Bros., Inc., 4711 Golf Road, One Concourse Plaza, Skokie, Ill. 60076.



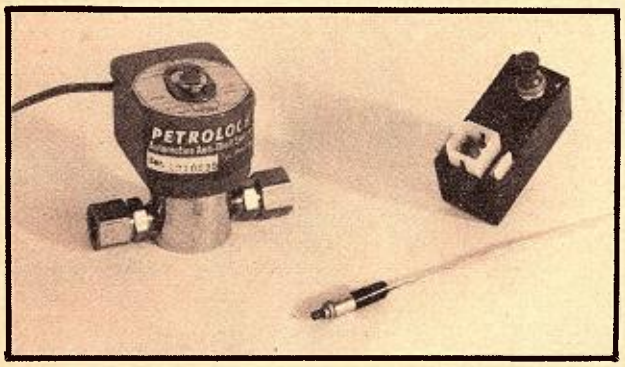
CALIFORNIA CLASS FOR VANS
Hooker's newest designs in spoilers and flares for Chevy and Dodge vans are expertly crafted fiberglass with an exceptional out-of-the-box fit. No body work, cutting or filling. These parts have a white gel coat finish or can be easily painted. The high lustre bumper-quality chromed push bar can be added as the finishing touch to this new, sculptured look on California vans. It is constructed of heavy gauge steel with smooth mandrel bends for great looking protection. Door extenders are also available. For more information contact Hooker Headers, 1032 West Brooks Street, Ontario, Ca. 91762.

STATE OF THE ART MUFFLER
Hushpower, Inc., Pataluma, California, has introduced its State of the Art automotive muffler line to the national market following a period of restricted sales to performance and import markets. In tests conducted on a variety of vehicles, noise emissions from Hushpower's muffler were at or below the noise emissions of the vehicle's original equipment. At the same time, back pressure was reduced by as much as 80 percent. By reducing back pressure, engine performance and fuel economy were significantly improved. Hushpower mufflers meet the 1977 noise emission requirements of the California Vehicle Code (the most stringent in the nation). Hushpower manufactures five original equipment replacement mufflers, which fit over 95 percent of the cars and small trucks on the road. The company also makes extractor systems for rear-engine VW's, Ghias, and Porsches, and racing mufflers for cars and boats. For further information, contact Hushpower, Inc., 100 Flugger Industrial Drive, Petaluma, Ca. 94952.



SHEEP SEATS
Tanfur Corporation, manufacturer of quality Sheepskin coats and jackets, has introduced a line of genuine

sheepskin auto and truck seat covers. Nature's finest insulator against heat and cold, these handsome sheepskin covers provide wooly warmth in winter and cool comfort in summer—keeping seats free of heat and stickiness. Quick to install, the sheepskin covers fit tightly over any car, truck or van seat. They wear beautifully and are soil resistant. Most of all, they make an enormous difference in driving comfort. They are priced at $25 to $35, available ppd. from Tanfur Corp., Sheboygan Falls, Wis. 53085. Catalog of other styles is also available.

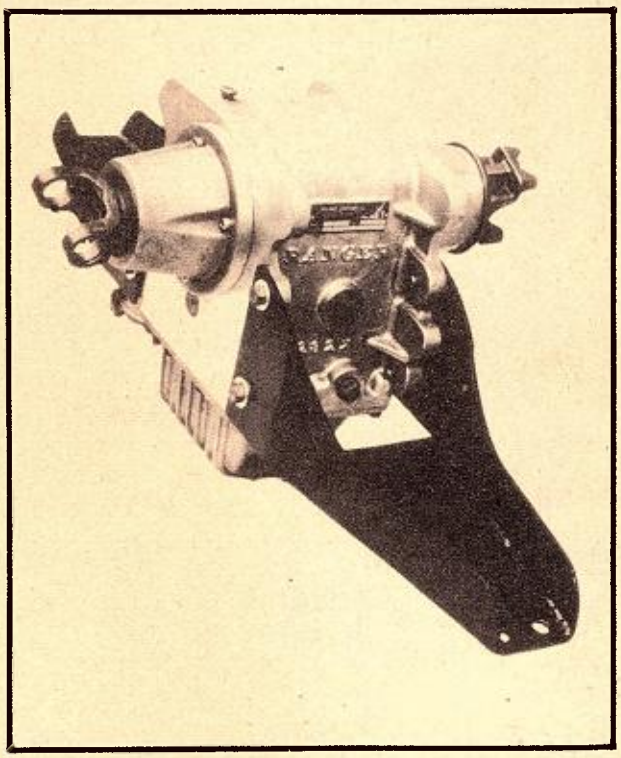


PETROLOCK

The patented Petrolock auto theft prevention system is automatically deactivated by turning off the car's ignition. A solenoid valve, installed in the fuel line, prevents the flow of gasoline until the system is activated by a hidden microswitch. Most systems require a toggle switch, under the dashboard, which is easily located by the thief. Petrolock's microswitch is small enough to hide anywhere in the car's interior. Components are shown full size. The microswitch opens the valve and the flow of fuel resumes. With the Petrolock system the car can be started but will stall out, for no apparent reason, once the gasoline in the fuel line and carburetor is consumed. The thief is caught off guard and has no alternative but to abandon the car. The control module contains a switch to override the system enabling the car to be left with mechanics or parking attendants. The Petrolock Corporation guarantees the effectiveness of the system. If at any time during the first two years the car is successfully stolen, Petrolock will refund the purchase price of $89.95. For the name of your nearest dealer contact Petrolock Corporation, 241 Crescent Street, Waltham, Mass. 02154.

UNSTUCKER

Hunters, campers and other outdoorsmen always face the possibility of getting their car, truck or camper bogged down in mud on some unpaved road far from immediate help. But now a new winch that attaches to the drive wheels of most vehicles is proving to be a popular solution to this problem in Canada where it is manufactured. Called the "Unstucker," the winch operates quite easily. When a vehicle becomes stuck, two drums containing a winching rope are loosely attached to wheel adaptor plates bolted to each of the rear wheels. These plates are permanently mounted out-of-sight beneath the hubcaps until needed. With the drums attached the rope is spooled from the drum toward a tree, post or other solid object which will act as an anchor. A short 10-ft. rope, called the anchor line, is then connected to the winching rope and anchor point. The two drums are tightened on the adaptor plates, the vehicle is accelerated and the spinning wheels become a winch to pull the vehicle free. General Motors of Canada offers the portable winch as an optional accessory on its truck line, and the Canadian Army is using the winch on 1-¼-ton trucks and Jeeps. The Unstucker is manufactured by Noremco Leisure Products Ltd., Hamilton, Ontario.



RANGER OVERDRIVE

Advance Adapters, Inc. has just released their new Ranger Overdrive, a completely self-contained unit that bolts between the vehicle's existing transmission and bellhousing and shifts manually. When used with automatic transmission equipped vehicles, the unit mounts between the transmission and the rear end. The Ranger Overdrive is a super heavy duty unit that has an all-aluminum case with a cast aluminum sump, roller bearing construction, and specially designed shifting mechanisms. The Ranger is rated at a full 25,000 G.V.W., making the unit applicable for motorhomes, campers, vans, trucks and many types of vehicles. The unit is a 27% overdrive, with some users reporting up to 25% better mileage in some cases. More information on the Ranger Overdrive, and the complete line of products from Advance Adapters in their new catalog are available for $1.00 from Advance Adapters, Inc., 13629 Talc St., Santa Fe Springs, Ca. 90670.

GM PRESSURE COOKERS

Three different recipes for turbo power

BY ALEX WALORDY

NO LESS THAN THREE General Motors divisions were showing experimental turbocharged models at the '77 new car previews. Buick's Indy pace car was the most elaborate show piece of the three. Chevy had a small Chevette Rally package that would show its heels to most cars with engines twice its size. And Pontiac fitted their new, remarkably smooth four cylinder cast iron engine with a turbocharger: it delivers power more than equaling that of a V6 or a small V8.

Turbos are in at GM. They can coax big performance from a small, light engine, giving power derived from engineering instead of just cubic inches.

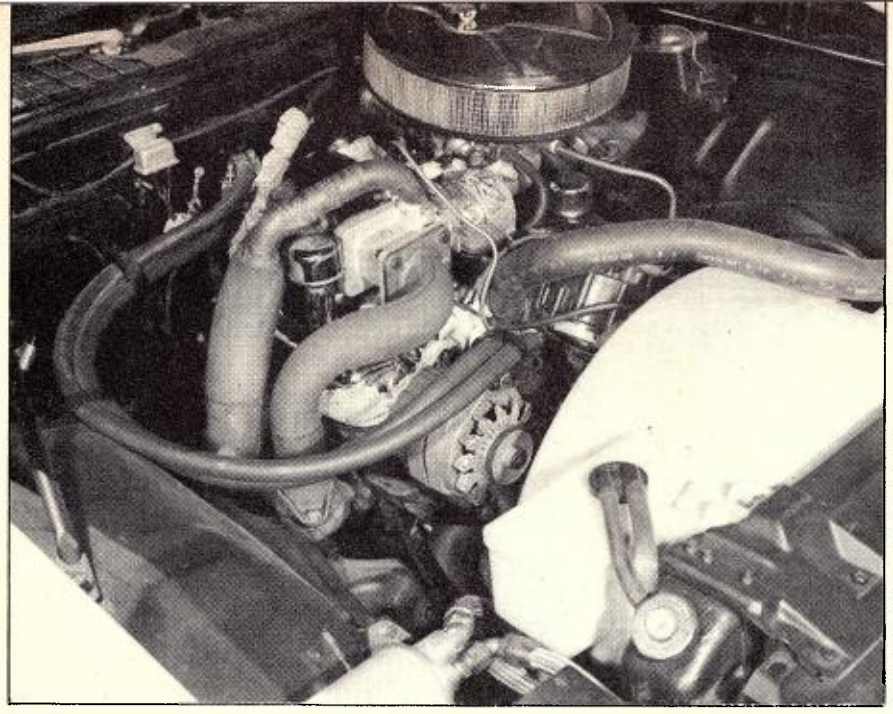
Turbos also have good points in relation to emissions. They can turn a non-performing controlled-emissions engine into a much more potent machine with numbers for NOX, CO and HC which are very acceptable—unless the standards are driven totally out of sight by headline-hunting legislators. GM engineers explain that the back pressure in the turbocharger acts like an EGR, helping to limit NOX in spite of the higher output. Some of the GM installations use the turbo in conjunction with the catalytic converter, further cleaning up emissions. It's a magnificent case of being able to have your cake and eat it too.

In California, the Air Resources Board doesn't see it that way. They display their lack of understanding of engine building practice by forbidding all on-road aftermarket turbocharger installations. But that's nothing new for Mr. Quinn's ARB.

The Buick Indy pace car V6 spent seven days a week for a month on the dyno during development; another two months went into developing the two cars themselves. It was "expensive," said Tom Wallace and Jeff Lane of Buick, "but we learned a lot."

What the fans saw— the Buick pace car leading the Indy 500 pack during three 80 mph laps, then picking up speed to 120 mph and exiting—was only a small fraction of the total use it got. Tom Binford, Indy's chief steward, was using one of the Buicks whenever he went out on the track. A.J. Foyt turned nine laps in it at a 120 mile-per-hour average speed: not half bad for a little 231-cubic-inch V6. Unser, Rutherford, Gurney—all of them took long rides, if for no other reason than it's a fun car that really moves.

The base V6 was tested in several configurations, with Rajay turbochargers designed to deliver 18, 20 and 22 psi boosts, giving the V6 307 to 320 horsepower. The compressor outlet is connected directly to the intake manifold because the engine gives better response when the turbo is close up. The disadvantage is that the engine



Buick's V6 Indy Pace car develops 320 horsepower from 231 cubic inches with the aid of a Rajay turbocharger. It's mounted on top of the intake manifold for best possible fuel distribution and a short path to cylinders. The waste gate and its connecting passage are next to the oil filler pipe.

compartment is tangled with exhaust.

The 455 Quadrajet is mounted above a plenum chamber which feeds the compressor. The plenum chamber has provisions for water heat, but none is needed since this is a top end, all out application. The carb is an off-the-shelf item recalibrated in fairly conventional fashion with jet, rod and hanger changes.

The exhaust piping, in its final shape, involved routing the exhaust from the left manifold to the right and then having it all exit from the top of the right manifold to feed the turbine inlet. During development, mild steel pipes were used, wrapped with insulating material to improve response in intermittant use by increasing the temperature. The insulation caused the mild steel pipes to burn out after a week's testing. For the

(continued on next page)

TURBO TIPS

A turbocharger combines a small turbine driven by the exhaust with a compressor which boosts the inlet air/fuel mixture. The turbine and the compressor fans are mounted on a common shaft without any mechanical connection to the engine except by way of the gas flow through them. The turbine can increase the pressure available on top of the piston for power, but it is not as hard on the bearings as a belt-driven Roots blower, because power for driving the compressor or the turbine does not go through the crank.

The more air the turbocharger delivers to the engine, the more fuel it can burn. This not only puts out more power—it also makes available more exhaust to drive the turbine.

As with almost anything, there are two sides to the turbocharging coin. On the good side, its power potential is high and the cost in dollars per horsepower is very modest. Unfortunately, however, people who buy turbos seem to have illusions about them, half-baked thoughts straight from Never-Never Land. A turbocharger *must* be matched to the engine. If you treat it as a magic black box bolt-on, it will never work the way you probably hoped it would. To make their kits more attractive, the turbocharger manufacturers cut costs; but to do so, kits get out that don't have all the necessary elements for good results.

It takes a certain amount of exhaust flow and particularly exhaust velocity to drive the turbine. Gas velocity is obtained by cutting down on the area of the nozzle in the turbine housing. If you want the turbo to come in at the low end for a street application, you need a small housing. Unfortunately, this interferes with top end power because a small turbine housing limits the total flow. If you switch to a large housing, you get the top end power but the turbo will not kick in early enough for good street performance.

The amount of boost that the engine can tolerate is limited by the bottom end as well as by detonation. To control the boost any one of several systems can be used. One way is a small turbine housing which gets the boost up to high pressure early in the rpm range, with the boost limited by opening a waste gate. This is simply an exhaust bypass valve controlled by the boost pressure. Waste gates are expensive

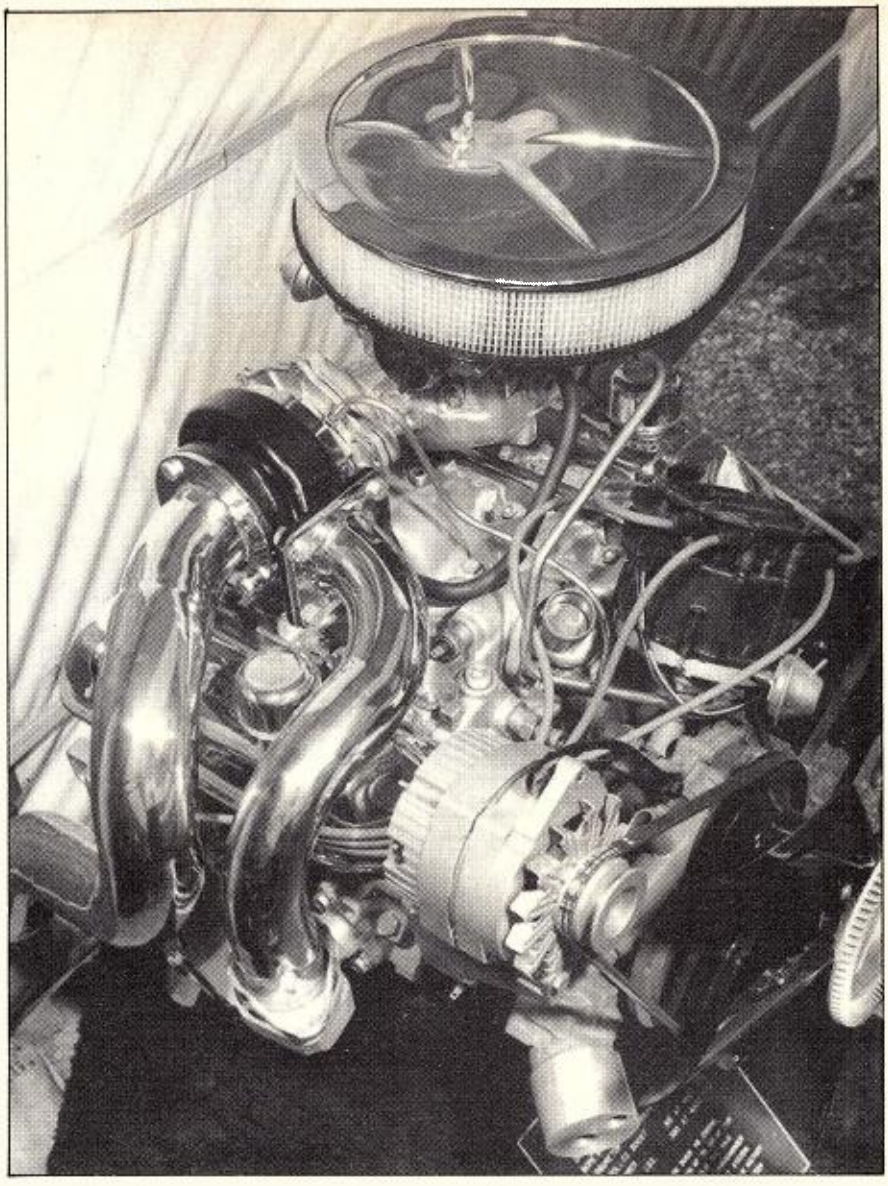
(continued on page 68)

race car, they were made of stainless steel and not wrapped: at Indy, grinding lap after lap, there is no problem building up enough heat. The special right manifold casting, which picks up exhaust from the left and has its outlet directed up towards the turbo, is also stainless steel.

Buick engineers were worried at first that there would be heat problems with the turbo so close under the hood, but this did not turn out to be the case. A series of tests were done in Phoenix, running the car full power, then shutting it off and parking in the sun for a heat soak. With no air circulating under the hood after the shutdown, the temperature rose considerably but the paint on the hood didn't blister. The hot exhaust manifolds did cause very high temperatures at the plug boots; as much as 600 degrees F. was recorded at one of them. The answer was installing some shielding, Packard's best wires with asbestos braiding and a wrap of reflective material on them and special boot covers.

The Buick V6 received 6:1 forged pistons, a waste gate to control the boost pressure and all the things it takes for a first cabin installation. The distributor is fitted with boost retard and has a special coil as well as a different module which gives quicker rise time.

After calculating the top speed needed, they geared the engine accordingly, with a 3.08 axle so as to keep the peak rpm down to the 5000 to 5200 range. Tom Wallace notes that you've got to watch going too high with your axle ratio. The engine doesn't see as much load in the low gears and there isn't enough time to build up the heat in the turbo. In this particular application, the top boost from the compressor and the gearing were all designed for raceway speeds. The same Buick Indy pace car was used at Pikes Peak.



This Buick turbo V6 mockup is probably closer to what a future Buick street type turbo engine will look like, because it doesn't have a waste gate.

John Pierce showed us the Chevette turbo application, which uses a new 2LM turbo from Schwitzer on the little 1.6-liter engine. This turbo is specially designed for use with small displacement engines; Pierce tells us that it just about doubles the performance figures above 30 mph. Driving the car convinced us he was right.

There is a lot of interest in this Chevy rally package and the fact that John Power came in second with it on his original trial run will make even more people want them. It's a desirable car: to get equivalent power, the same Chevette would need a 2.5 liter or bigger engine. And the emission numbers are good.

The Chevette engine uses TRW pistons which give it a 6:1 compression ratio and uses a lead free high octane reference fuel called Indolene 30. This fuel, with the octane of pump high test, is used for industry tests in conjunction with catalytic converters. The distributor is original, but reworked to retard the spark as boost increases, with the total advance trimmed back to 30 degrees.

The turbocharger sits low and bolts to a plate welded to the side of the existing exhaust manifold. There is no waste gate, but the standard Chevette muffler provides enough restriction to limit the boost to 10 psi. Oil pressure is fed to the turbo by a "T" fitting that also branches into the oil pressure sending unit, and oil return goes to the side of the oil pan. There's a special butyl rubber mount for the carburetor which is designed to eliminate fuel frothing. A cable replaces the original linkage.

The original axle ratio is retained. Since there was no limited-slip differential available for it, they just welded up the stock differential. A set of Cosworth 13x6 aluminum wheels with English 180-13 Goodyear Rally tires was bolted on. To top it all off, John Pierce had his little car dressed up with fender flares and an air dam from Jerry Palmer's GM Styling Studio.

Chevrolet Engineering also had a unique turbocharger application on a '76 Cosworth Vega, which has been discontinued for '77. It had special headers, complete with fittings for air injection nozzles and GM's new Pulseair. Pulseair is a reed valve setup which allows air to be drawn into the exhaust headers by the exhaust pressure pulsing. You get the air supply needed to burn off hydrocarbons, but do away with the pump.

There is always a problem when air and fuel are pumped from the turbocharger to the opposite side of the engine, particularly when the engine is cold and the speeds are low. It takes velocity to keep fuel in suspension and the long cross-over pipe gives the fuel more time to settle out of the air stream. With the Cosworth, the problem is completely eliminated since only air is pumped through the cross-over pipe; the fuel is delivered by the injectors right at the ports.

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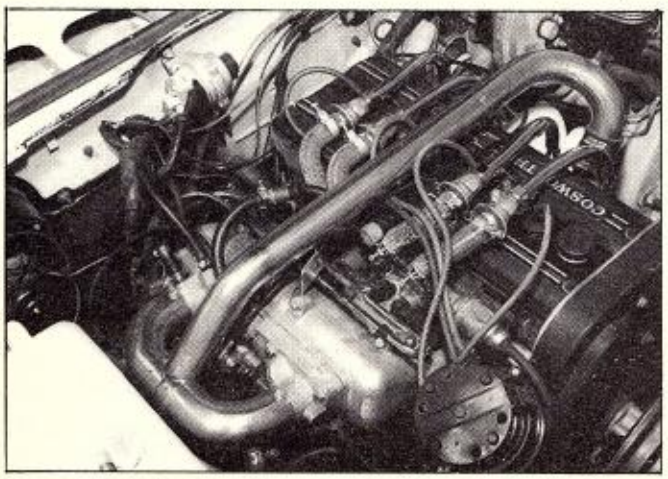
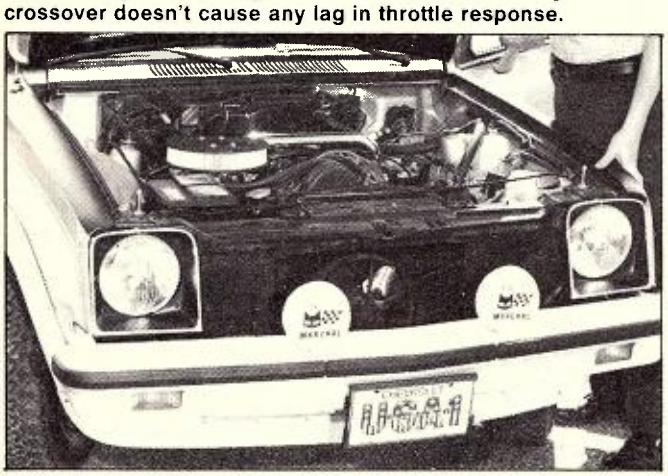
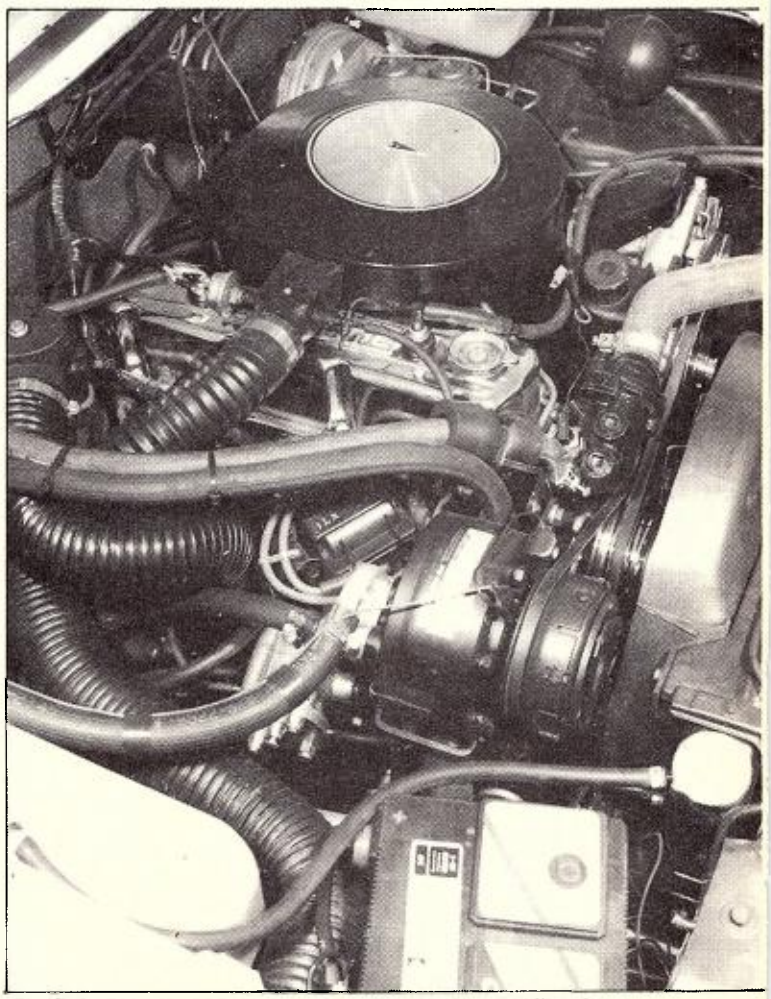
Pontiac's turbocharged Sunbird will be a delightful street machine if it ever goes into production: it's smooth, easy-going and powerful.



Chevy turbocharged a '76 Cosworth with excellent results. With fuel injection jetting fuel in at the ports, the long crossover doesn't cause any lag in throttle response.



John Pierce at Chevrolet gets excellent throttle response with a Schwitzer 2 LM turbo on the Chevette Turbo Rally car. It feeds the stock intake manifold through a crossover pipe.



The Schwitzer 2 LM turbo used on the Pontiac 2.5 liter four is specially designed for use on small engines. Carburetor in stock location receives air boost through the air cleaner.

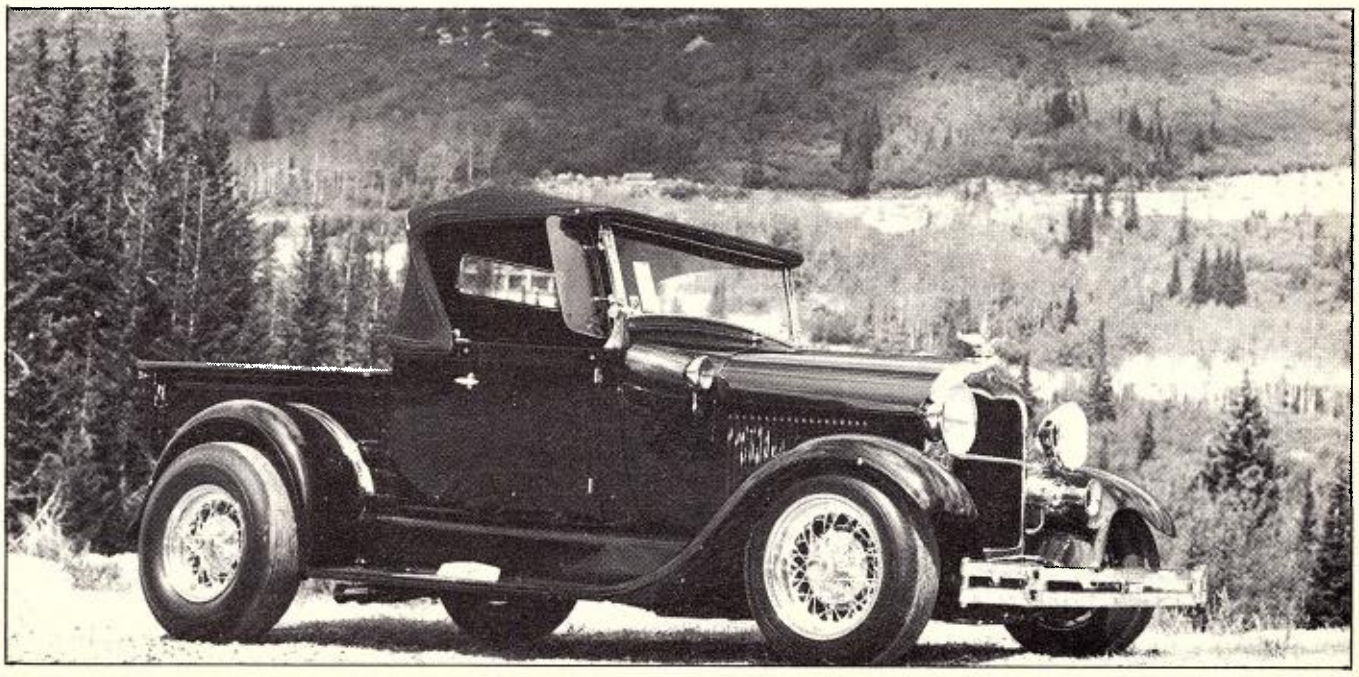
ROCKY MOUNTAIN LOADSTER

Model A roadster pickup from the high country

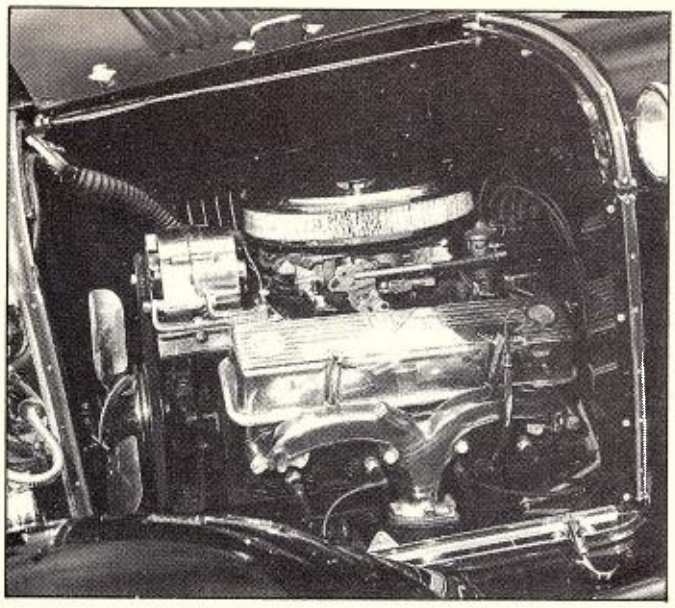
BY JEREMY YOUNG

THE PUTTERING NOISE of a Ford Model A Motor is one of the most soothing sounds you'll ever hear. Sputtering quietly, gears whining, it sings a regular lullaby, rhythmically harmonizing with the car's squeaks and rattles as you bounce down the road. The dependable, low-revving motor makes a guy feel comfortably middle aged; it makes him want to settle back and take it easy.

Now we're all for avoiding high blood pressure. But we also like to get the blood *moving* once in a while. And that's why Jerry Lockhart put a 327 Chevy engine into his '29 Ford pickup; it makes the heart beat faster. A stock A



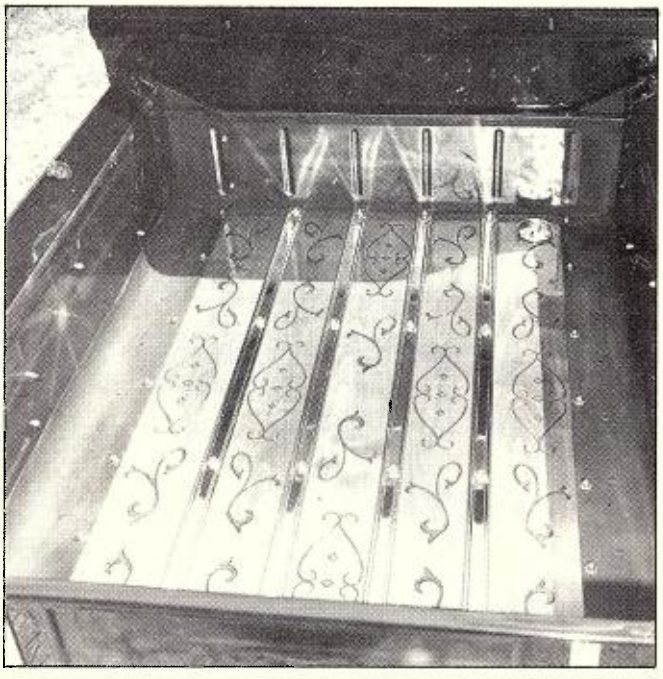
PHOTOS BY RICK ECCLI



The six-blade fan is about the only Ford item under the hood. The Chevy 327 now has Mickey Thompson pistons and rods, a Duntov-Fuller cam and Holley carb. Exhaust manifold is stock.

Inside, a 1932 Ford dash with a set of Stewart-Warner gauges installed has replaced the original; CB, AM/FM and tape machinery are mounted underneath. Doors and seats have been tastefully upholstered in silver-blue mohair.

It's easy to see that the owner doesn't haul concrete block around in the beautifully finished, filigreed pickup bed.



Model will get you up over 60 if you give it plenty of time, but Jerry doesn't have to wait long for the needle on his new-fangled speedometer to wind a lot farther than that!

Jerry's a construction worker in Salt Lake City who acquired a rather run-down old Ford for a hundred and twenty-five bucks. He put a sizeable amount of work into it and managed to keep the cost of the project down to about $2000. That's not too much to pay for a beauty like this.

The roadster-type truck might pass for stock if it weren't for the special wheels and the dropped front end. Everything is original '29 Ford vintage, down to the cowl-mounted sidelights. Jerry and his friend Keith Hendricks put buckets of elbow grease into the lustrous black paint job; detailing was done by Honda John of Salt Lake. The interior upholstery was very tastefully executed in a marvelous silver-blue mohair by Bob's Top Shop. The interior also sports a dash from a '32 Ford with a set of Stewart-Warner gauges and CB, AM/FM and tape electronics mounted underneath.

Neatly nestled under the innocent-looking hood is the potent 327 small-block Chevy engine. Bore and stroke are stock, but considerable work has been done on the motor. The crank was polished and installed with M/T pistons and rods. A Duntov-Fuller cam replaced the original and the heads were carefully worked over. A Corvette manifold and Holley carb handle the intake. Exhaust exits through stock chrome manifold—there's no room under the hood for headers—and dual exhaust systems. The motor is kept cool by a special Jakes Bountiful radiator.

Jerry put a kit into the Powerglide automatic for snappier shifts, then mounted the whole powerplant using a removable frame crossmember and fabricated side mounts. Torque is transferred back to a '57 Chevy rear end which is sprung by coils borrowed from a Corvair front end.

Up front the rod rides on a '32 Ford four inch drop axle with '48 Ford spindles. The stock Model A spring has Teflon between the leaves for smoother action. Control arms were fabricated and hooked to a '65 Econoline steering box. Wire wheels all 'round hail from a 1954 Buick Skylark and mount Goodyear rubber.

Jerry, an NSRA member, says he drives his Chevy-powered Ford every day—and he doesn't shy away from long trips, either. He's managed to come up with the rare combination of a rod that's at home on the street and does well at shows as well. Awards so far: "Best Overall," "Best Truck," "People's Choice," "Best Paint," "Most Original" and two "Best Opens." *That's* success on a short budget.

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BOOGIE BUS

Gary Worden and his van are headed for full tilt good times

BY FRED MACKERODT

A CURRENT SURVEY SHOWS that the average van owner is 22 years old and that he's owned and worked on at least one car before purchasing his first van.

Gary Worden of Canastota, New York, doesn't fit this statistical average and is in fact way above average in automotive aptitude. Not yet 21 years old, he's owned, operated and worked on 15 or 16 different cars. (He says he can't remember the exact number because there have been so many.) He's also managed a speed shop and built race cars. Gary is a cabinetmaker by trade.

Gary combined all his skills and talents in this van modification. Not only is he pleased with the fine results, but response from others has prompted him to seriously consider a van mod business of his own. He certainly is well qualified and his work speaks for itself.

"Full Tilt Boogie Bus" is a Dodge B100. Rather than spend the money for a brand-new van and start from the ground up, Gary bought a van that was originally modified by one of the professional van builders. It had become dog-eared in the short time it was on the road before Gary picked it up. But the price was right—$3600—so he decided to strip the original work almost completely and start from scratch.

Starting with the exterior, Gary developed a real show-stopper. (He's already won nine trophies at truck-ins and shows.) In conjunction with artist Mark Gardner, the van was painted predominantly in shades of orange and yellow, using a wide range of the two colors from hot tangerine to cool lemon. The driver's side of the van has a water-scape—a rendering of a van parked by a lake. On the passenger's side (upper left) a triangle containing patterns of V-striping which culminate in a pair of eyes that seem to stare right through the side of the van. The effect has to be seen in real life to really be appreciated.

A flame design covers the lower half of the van on both sides. The stylized flames lapping at the sides of the van and the eyes peering out give a three-dimensional effect.

Giving a guided tour of the exterior, Gary pointed out that the flames were produced by an overall pattern as part of the background. This is completely different from most flame treatments—which are often decals painted on the surface as a flat foreground design.

As for the striping, murals and optical-illusion eyes, these have been created largely through a natural talent in the use of color and mastery of different techniques of paint application—especially spray painting and air brushing. A front spoiler, porthole windows and prism tape on the tires are also featured on the exterior. The total effect makes Gary's van an eye-catcher from near or afar.

In the interior, another display of artistic talent can be found on the door of the specially-built ice box. It has too many elements to describe here, but it can be seen in the accompanying photographs. The ice box is mounted in a cabinet that includes storage space, a built-in bar and an eight-track stereo.

The four inches of foam under the floor and four more inches of foam on the bed have been covered with shag carpeting. The shag is mostly orange with a speckling of black and brown, complementing the exterior colors.

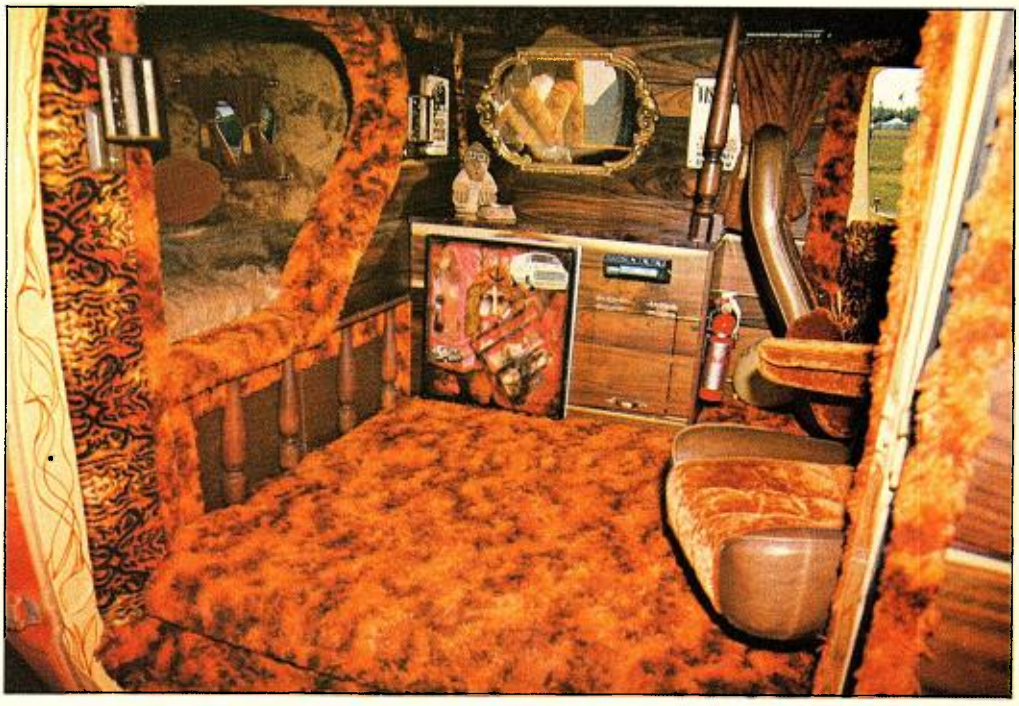
An air vent was installed over the bed, even though the van has air conditioning which Gary uses on hot summer days. Whatever the weather, though, he drives his van daily and has put 110,000 miles on it in less than two years.

To keep things moving smoothly, Gary has added a set of Hooker sidemount pipes and headers to let the 360-cube engine breathe, a set of adjustable Monroe Super 500 shocks up front and Gabriel Hi-Jacker huff-and-puff dampers in the rear. Keystone mags mount Goodrich Radial 50 tires.

The cost of the interior, exterior and mechanical work has added $3400 to the price of the van. This includes an AM-FM radio and a CB.

Gary is a member of Mid-York Vans and whether he's trucking with the club or on an adventure of his own, his van delivers power, comfort and a distinctive look—which is the name of the game in vanning.

Top, Boogie Bus is a show stopper; it's already won 9 trophies at truck-ins.



Interior was redone by owner. It features a refrigerator/bar/stereo console, 4-inches of foam under shag carpets.

Below, Worden has put over 110,000 miles on rig since picking it up used. Total cost, including repainting and new interior, comes to $7000.

After some trial and error, the owner found a hitching setup which makes the trailer pull as if it were an integral part of the van—and its appearance has the same message.

Match Box

A nose-bashed van makes a harmonious trailer

BY FRED MACKERODT

WHAT DO YOU DO when you've bought your new van, built it up the way you want it, put 100,000 miles on it travelling to van meets all over the country and then find yourself left with nothing else to do with your spare time? Build another van, of course!

Dave Paige of Hamilton, Ontario, was confronted with this situation: he was almost completely satisfied with his '73 Chevy, but he wanted to do something else. He figured that if he built another van, he'd have to sell the first one and he didn't want to do that. In 100,000 miles, a vehicle tends to grow on you. It almost becomes part of the family.

Then one day when Dave was cruising around his neighborhood he saw a '71 GMC that had been in a horrendous fender-bender. The van was a "total." The frame up front was bent like a pretzel and the van seemed to be good for nothing else but another accident statistic. But even though the body and frame up front looked like it had had a date with King Kong, the rear end was perfect. The idea fairly sprung at Dave: "Why not build a Trailer to match my van?" Anybody who has been in the van thing for more than ten minutes knows that the Chevy and GMC vans are exactly the same except for the nameplates.

Paige dickered with the owner and finally got him down to $800 for the wreck. As it turned out, the wreck provided an additional bonus. It came with a nearly perfect, low-mileage 350 V8. The motor in Dave's Chevy was an anemic 307 V8 which, being a 1973, was already suffering from pollution-controlitis. Besides, having gone 100,000 miles, it was already wheezing and hacking. Dave picked up a set of heads and a camshaft from an earlier Z/28 Camaro. With these and some additional tweaking, his new motor turned up 325 horsepower on the dyno.

Now putting a powerplant like this in front of the original two-speed automatic in Dave's Chevy would be like draping Raquel Welch in a loose-fitting bed sheet—a waste! So Dave went out and picked up a wide-ratio four-speed to buckle behind his new-found power.

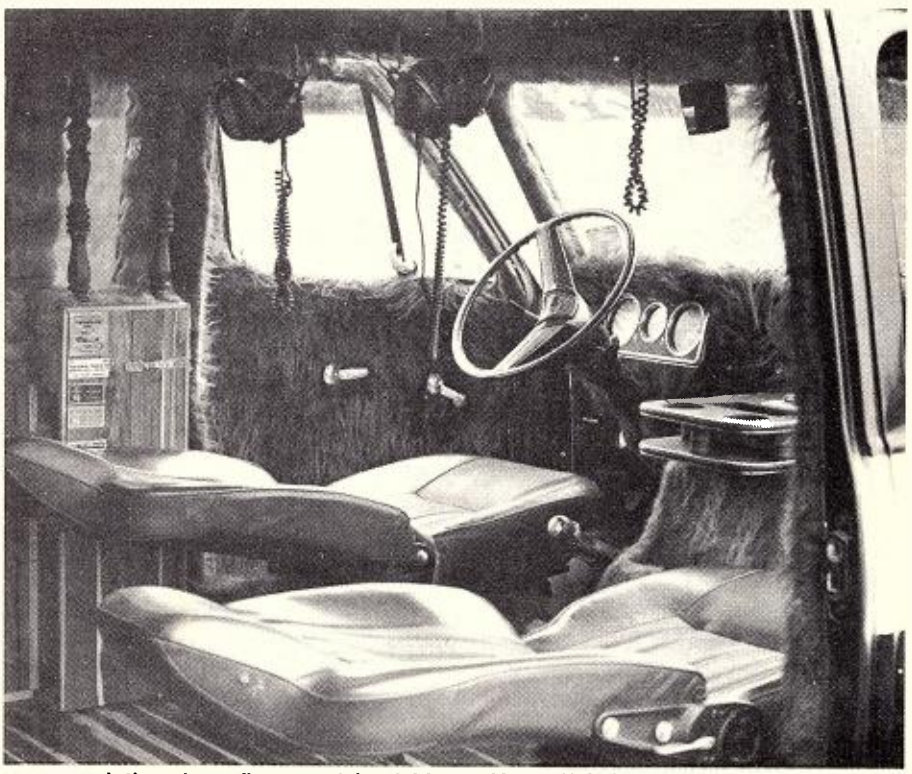
To start the work on the trailer, Dave used a Skil saw and a metal-cutting blade to hack off the front end of the GMC. (He later sold this with the remains of his 307 for $300.)

Next, he welded a steel plate over the opening. He had been thinking of doing the front end of the trailer in fiberglass, but he decided not to. The opening left in the GMC when he hacked off the front end was just too big to cover with fiberglass and retain structural rigidity. It would flex in the wind, and fiberglass that flexes also cracks.

When he had the trailer sealed up, Dave began to work on the interior. He paneled it with northern oak to match the interior in the tow van. The floors are done in rot-resistant cedar which should outlast the vans themselves. Dave furnished the trailer as the sleeping quarters. He installed three bunks and a sink for quick wash ups. The tow van houses the dining room, with plenty of seating for at least six people.

Building the matching trailer was

(continued on page 69)



Both the van and the trailer with its sleeping accommodations have floors and furnishings of beautiful, durable cedar.

BLACK GOLD

Refined it is, crude it's not

BY ROBERT HEGGE

FOR THE ROY WILLIAMS', vanning is a family affair. But surprisingly, it wasn't Roy's idea to get into vanning at all.

According to the 32-year-old Missourian, "It was my wife who first became interested in vanning. She wanted me to get one and fix it up. I used to run around in a '23 T-bucket but vanning has the roadster's beat." Like the rest of us, Roy had discovered you just can't take the family out camping in a 1923 street roadster—not comfortably anyway.

All the interior stitching in the Williams' "Black Gold" van was done by the family. Linda came up with the choice of the orange and red shag, walnut ceiling panels and cabinet trim. Six inches of insulation was used under the wood panels and 2x4's were used for frame construction. Foam rubber was put down for the carpet foundation. The bright carpet has been carried all the way into the driving compartment: it flows under the black Naugahyde captain's chairs and up onto the engine cover and instrument panel. All the carpeting is stitched down to the running board in a neat design. An unusual feature of this van is the use of a set of windows on only one side of the truck. Linda produced the black velvet curtains that cover them.

To separate the family room from the rear bedroom, Roy installed a set of lathe-turned wood spindles mounted atop the upholstered siderail. The walnut panelling is carried out to the rear of the van over the double bed which is covered with a black velvet spread. Cushions of red and yellow contrast with the velvet covering. Indirect lighting in the arch over the bed gives a warm glow.

The built-in wet-bar features the use of walnut paneling also and helps to set off the small glass-top nightstand—which was fashioned from wrought iron by the builder. The choice of telephone, positioned next to the bed, adds to the overall feeling of the living area.

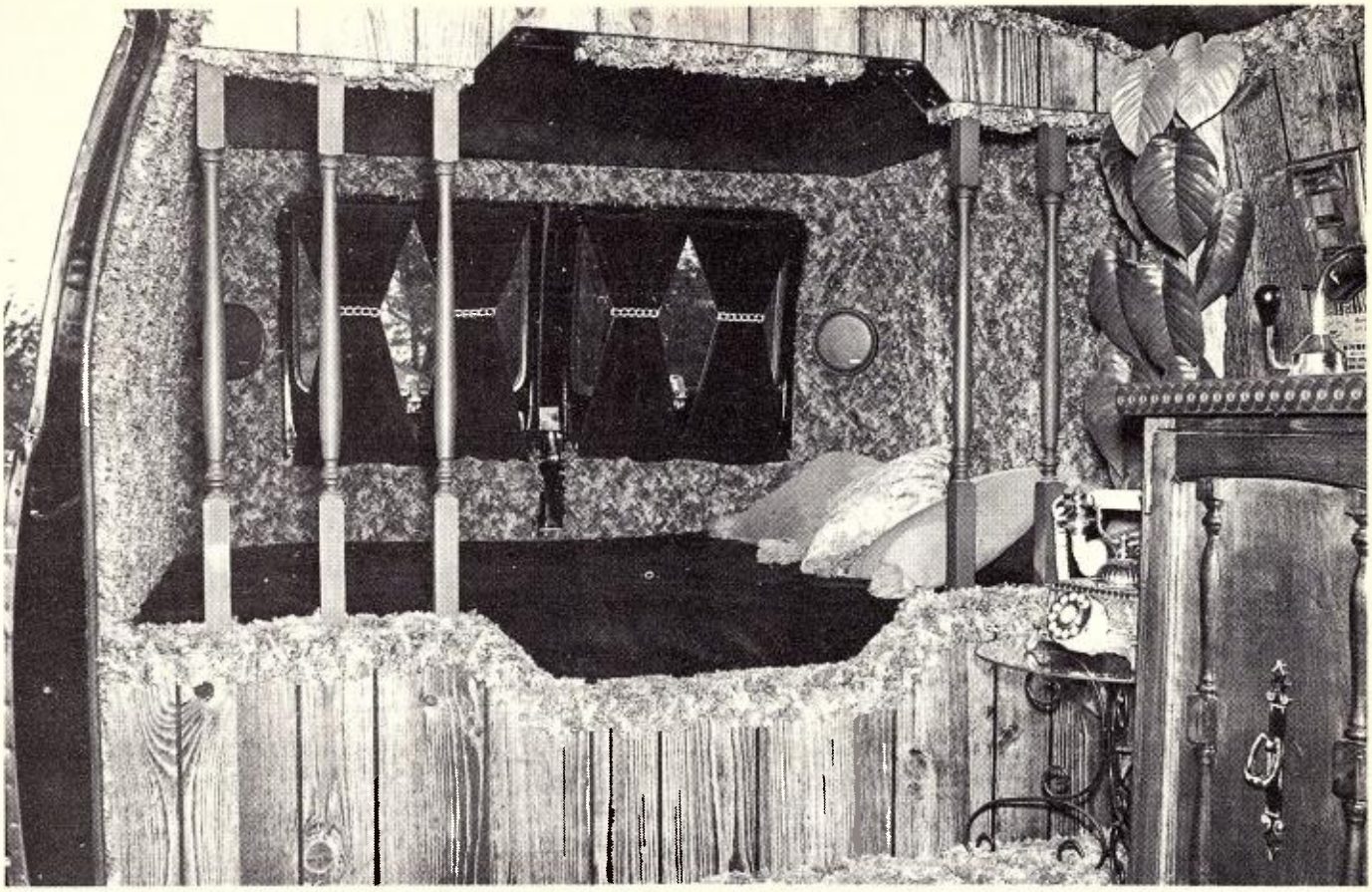
Up front in the driving compartment we find factory air, power steering and brakes, tinted glass for that bright Missouri sunshine and cruise control for sitting back and just rolling along. To keep in touch with all worlds of sound the Williams' make use of an AM-FM radio, an 8-track tape deck and a CB—to hear what all the good buddies are doing up and down the highways.

The Williams managed to finish the interior in three-and-a-half months.

The 1975 Dodge came with the long 127-inch wheelbase as well as the 318 V8 mill, auto gearbox and custom side pipes. Following the mounting of a set of flares and a front spoiler, U.S. Mags were fitted at the four corners. Goodrich rubber has been fitted on the 8-inch front wheels and the 10½-inch rears. Like many vanners today Roy prefers the wide skins for their super-tough appearance.

The exterior paint scheme, sprayed by Larry Stanley—the owner of Van Boutique in Springfield, Missouri, features black with gold-flake shot into the panels. Polyurethene covers the complete truck. The pin striping is gold.

The Williams' have done more than create an outstanding piece of machinery. They have done something not enough families do: spending time together working toward a common goal, creating something of which they can be proud.



Room for two: The Black Gold's sleeping compartment would do justice to a good motel. Note French phone next to bed.

Lathe-turned wood spindles separate bedroom from family area. Archway over bed features indirect lighting.

Built-in wet bar is walnut, as is paneling.

Larry Stanley shot the Black'n'gold paint that gives the van its name.

Williams family stitched up interior, featuring shag, walnut and velvet.

MINI-DIESEL

The Tyson Show Team's semi-semi

BY JEREMY YOUNG

PHOTOS BY DEAN SPRUILL

RECIPE:

Chop: one old wreck of a Corvair van

Add: one 455 Hi-Perf Olds engine

Stir in: assorted hunks of junked Fords, Chevies and Oldsmobiles

Marinate in a large vat of homage to the diesel semi

Simmer for several months while it comes together

Serve Hot!

What've you got?

Is it a van? Is it a truck? Is it a diesel-powered trucker's van? A gas-powered vanner's truck? None of the above?

Actually this is the recipe for a show-tow vehicle cooked up by the Tyson Show Team from Denison, Texas. It's shown at custom car, truck and van shows along with the team's two other show trucks and is then used to transport the other trucks to the next show.

Bill Tyson, Robert Asay and Joe Ford built their "Mini-Diesel," (the 455 Hi-Perf motor does run on gas) entirely by hand. They sliced five feet out of the middle of a Corvair van, put the two ends together and sealed the rear doors. Then they yanked the frame from a bashed '76 Oldsmobile Regency, channelled and boxed it and added eight inches to the end.

They fabricated the front suspension from a Ford straight axle, homemade springs and Chevy spindles. The two rear axles are courtesy of Olds 88's. Only one of them is driven—the rear one is a floater. The front is on coils with Monroe shocks, the rear on leaf springs.

The Olds 455 High-Performance engine has been left more or less stock. Its cooling is handled by a specially-built seven-core radiator with dual squirrel-cage blowers forcing air through it. Exhaust gasses blast out through a pair of Rocket side pipes mounted on end to point at the sky.

Power travels through a stock Turbo 400 transmission and via a 14-inch driveshaft to the rear end. Wheels are all from Toronados. On the rear, the inner wheels are right-side in, the outer ones, wrong-side out.

The red, white and blue upholstery was done by D.D. Trim of Oakcliff, Texas. The center console, besides mounting the CB and 8-track, has gauges for fuel level, amperes, oil pressure, vacuum and air brakes. Behind the seats is a functional sleeper or "dog house."

The paint was farmed out to the Alton CoLords of Fort Worth. The mural on the back was done by a very talented 18-year-old named Alton who just dropped into the shop one day and offered his services.

In the short while that the Mini-Diesel has been hauling the team to shows around Texas, it's already hauled in several trophies including "Best Hand Built" and "Best Truck In Show" among them. It looks like Tyson, Asay and Ford have found themselves a recipe for success.

The back of the chopped-off Corvair van features a Texas city-scape. Rocket side-pipes look good pointing at the sky.

Under that hump between the seats resides an Olds 455 Hi-Perf motor. And you can sleep right on top of it, in the functional "dog house" behind the padded curtain.

The fifth wheel is ready to take on the matching trailer in which the Tyson Show Team transports its two other show trucks to the festivities. The rear axle is a floater.

Wheels all around hail from Olds Toronados, mounted in the normal way on the front, with the outside ones on the rear mounted wrong side out.

PIKE'S PEAK

A van that reaches for the heights

BY ROBERT HEGGE

EL PLATA DIABLO might be a bit plain on the outside but when 31-year-old builder/owner Wayman W. Pike, Jr. opens the doors on his van, look out. Pike has been a vanner since the rigs first became popular in this section of the country and did the complete interior with no outside help whatsoever.

The El Plata Diablo has wall-to-wall carpeting, plush, padded, red-velvet walls and a tile-mirrored ceiling. The owner spent many long hours assembling this fantastic interior. Young Pike also came up with the far-out iron scrollwork mounted on the walls, which involved much welding.

All the woodwork was also crafted by the Missouri vanner, including the swinging TV mount, center mounted arch, coffee table and snack tray. Slick black vinyl was used over padded foam on the scaled-down couch that completes the interior of this rolling living room.

The rear bedroom features a full-size double bed with over six inches of foam rubber. This guy can really get a good night's sleep. Black drapes cover a portion of the white silk curtains—which Pike stitched himself—that cover the rear door. To insure complete privacy a pair of black drapes divides the front compartment from the center living room.

The front compartment has twin captain's chairs stitched in red crushed velvet. Black vinyl is used for the padded doors and headliner. Also contained in the headliner is the owner-installed sunroof as well as the high-mounted console controls and air outlets. Extra outlets are mounted on the dash panel over the handsome wood snack tray. Also housed over the engine cover is the CB outfit and phone.

The rig is a 1975 Dodge Maxi van, sporting the popular 360 CID mill. The silver van has been fitted with power steering, brakes and air conditioning.

Pike mounted a dual battery system with fuse block to provide adequate juice for his TV, CB, AM-FM cassette stereo, interior lighting and fog lights.

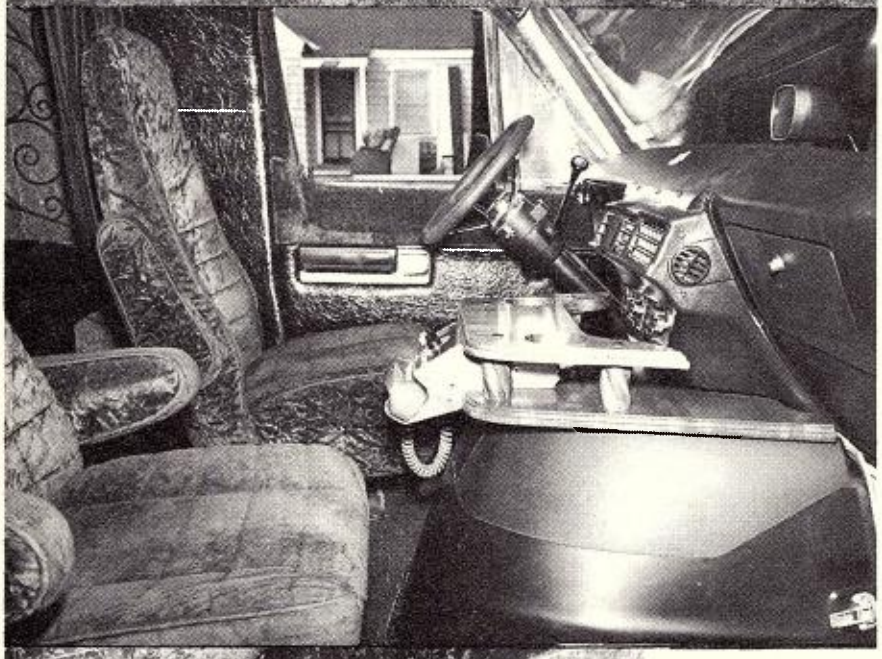
Helping to create the low, wide profile of this Dodge is a set of wide-rim mags and B.F. Goodrich skins. Neat appearing fender flares are used to complement the body lines and a front spoiler fills the area under the chromed bumper. Above the stock grille there's a small scoop with a screened opening. Low side pipes get the exhaust out where it belongs. A low gravel deflector mounts under the body connecting the rear flares. Front and rear lamps are stock for the present but there will be changes in the near future.

The pretty silver metalflake enamel comes on like gangbusters under the hot Missouri sun and the trick colored tape lettering and pin-striping are neat touches. The builder took me for a ride and this van handles as well as it looks. Original price for the van was $4,600 and total investment amounted to $7,000.

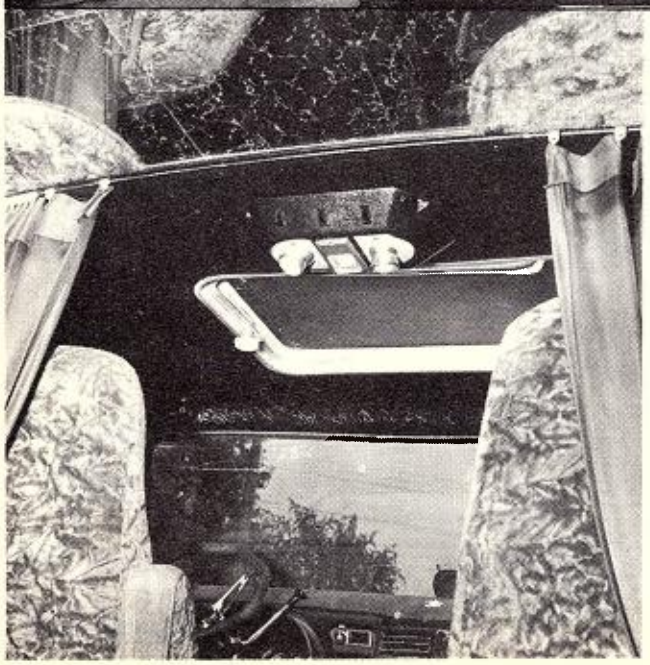
As a member of Sho-Me-Vans, Limited, Pike does his bit to impress the public with courteous driving, neat dress and by lending aid to stranded motorists. That is, of course, after he's impressed them with his van.

Above: The rear bedroom features a full width bed made of 6 inches of foam. Mmmm.
Below: El Plata Diablo is mild on the outside with flares, a front spoiler, side pipes and wide tires and wheels.

Looks like a very plush living room, no? To gauge the couch's size, compare it to the driver's seat.



The front cabin continues the plush theme with crushed velvet captain's chairs, phone and air.



There's a skylight to let the sun shine in and twin aircraft-type spotlights to light up the night.

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RUBBER RAP

What the engineers are doing to make you stick to the road

BY ALEX WALORDY

LET US ASK ONE simple question: Is it the top or the bottom of the tire that holds the car up?

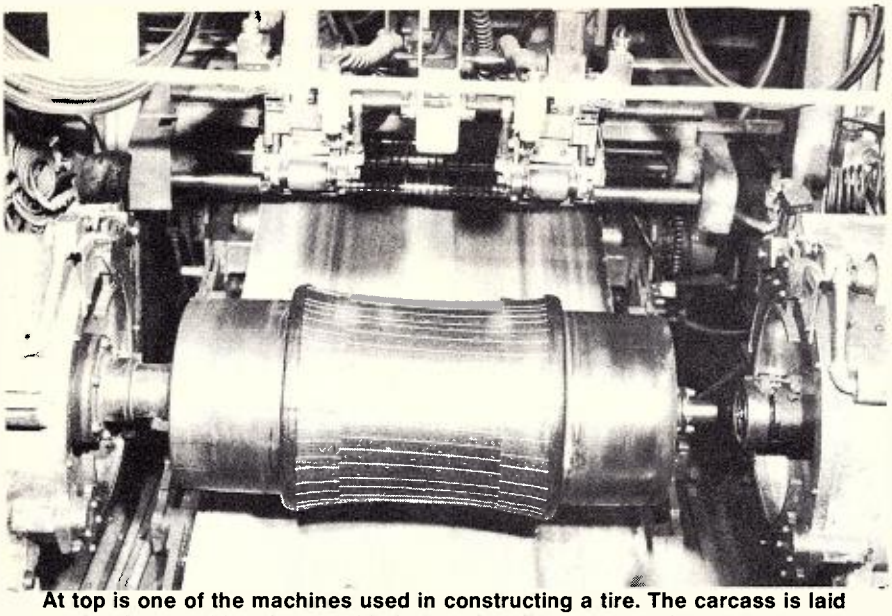
If you are one of the 99 percent of all people who automatically give the wrong answer, you might consider it worthwhile to look in on some of the other wonders of the tire—such as what happens at that "foot print" or "tire patch" as the tire changes rapidly from round to flat then back to round again.

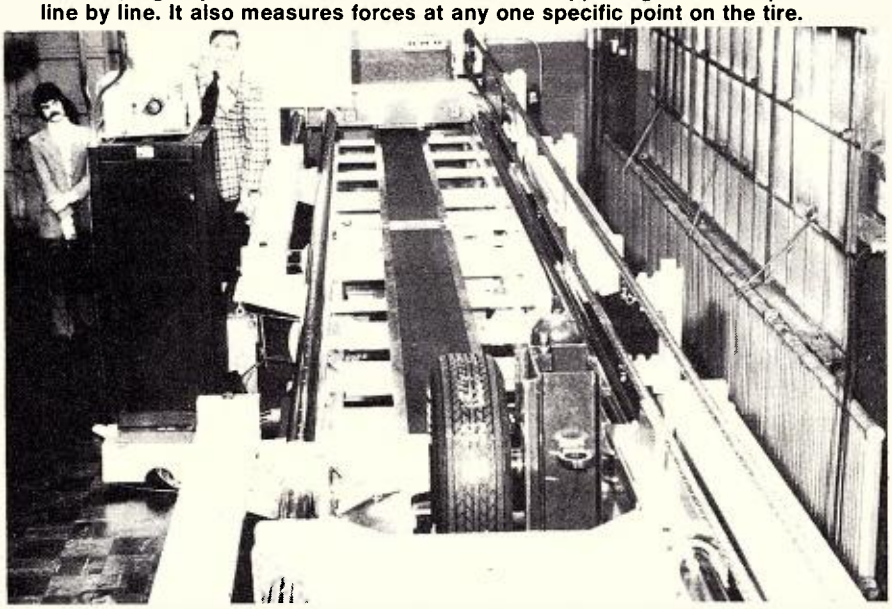
During our sundry visits to Detroit, we have been fortunate to meet with a couple of challenging tire engineers whose thinking goes far beyond worrying about how many tires can be put out per day. Seymour Lippmann of Uniroyal is the manager of the Tire Vehicle System Laboratory; he and his associate Ken Oblizajek gave us a unique look at their lab and the things they research. At the other end of town, at Tire Systems Engineering in Grosse Point, we looked up an ebullient Frenchman named Jacques Bajer, whom we knew for his suspension and tire development work at Ford Motor Company. A few years ago he was asking simple basic questions like—why does a round and apparently symmetrical tire run crooked or bounce on a flat smooth road? Sounds a little crazy, but it led him to a patent on a machine that checks and inspects radial tires under load, a machine which is used in one form or another by every major tire manufacturer.

Let's begin our tour of tire technology with a look at the tire carcass, the body of the tire. The centermost part is the beads, a pair of rings formed of many loops of wire. The ends of the load-carrying carcass plies are turned around the beads, which anchor them. When the tire is inflated, air pressure pushes on the fabric cord and applies tension to them. The beads take the pull of this tension and are the base support of the tire. The outward pressure applied to the beads also squeezes them against the tapers of the rim, forcing them to seat and seal.

At the beginning of a tire's construction, the fabric plies are lying flat, rolled up on a cylindrical drum. The beads are put on and the ends of the fabric are folded over the beads on each side, like the end of a sock being rolled over a rubber band on your leg. The carcass can then be shaped. Bajer explains that the beads are important as anchors even while the tire is being built.

Lippmann points out that the carcass of a tire is always formed in a curved shape because all the flexible cord strands can do is pull, take tension—so they must form curved surfaces which they can pull around.





At top is one of the machines used in constructing a tire. The carcass is laid on the drum and beads are added; then the plies are turned over the beads. Bottom: a tire is rolled along the 40-foot bed on this testing machine. At the end, a group of transducers senses what is happening in the tire patch line by line. It also measures forces at any one specific point on the tire.

The exact shape can be constrained by belts or bias plies, but not to a surface which is actually flat. There is a direct relationship between the curvature of these plies and the amount of tension they must bear at a given point.

This returns us to our first question: How does a tire support a load? It does so from above, not from below—it acts basically like a suspension bridge or the spokes in a bicycle wheel. There are tension forces that act all around the tire from the beads on out, tension forces created by the inflation pressure. When you apply a load to the underside of a tire and deflect it, the tension forces on that part of the bead are reduced, since you can't push with a string, you can only pull with it. The force from the road is transferred to the upper part of the tire, where the tension in the fabric is increased, pulling harder against the bead, holding up the wheel rim. It may not sound right, but it's true: the top of the tire holds up the wheel, not the part which is against the road.

Suppose you inflate a tire to 30 psi while it's off the car, then put it on the car, loading it. Does the pressure increase? Yes, it does, but very little, maybe a pound or two. The bottom of the tire is now deflected and the volume of air reduced by some small amount. However, in relation to the total volume of the tire, this change isn't significant, so the pressure doesn't go up much.

Running at highway speeds gives a more significant pressure increase. For instance, a tire inflated to 24 psi may build up to 30-32 psi in the summer or 28-30 psi in the winter. The operating temperature is the most important factor.

In a way, the tire is a self compensating device. The harder it's asked to work, the greater will be the heat buildup. The pressure rises in proportion to the temperature and helps carry more load. There is a limit at which the temperature increases and the resultant pressure causes the tire to go *zap*. It may not happen suddenly; heat kills the tire by degrees, weakening it slowly. Later it fails and the driver says, "That terrible tire! I wasn't even going 35 miles per hour!" But he doesn't take into account that nice stretch of road which Channel 19 told him was free of picture takers. Bajer points out, however, that heat is not the only thing which can do in a tire. In cold weather some tire cords become brittle, causing tire failure.

Lippmann talked to us about how air molecules can dissolve right through tire material. Nearly everything, including rubber, is permeable to air under pressure; the higher the pressure, the greater the migration of air molecules through the material. As it does so, the air oxidizes the rubber and affects the life of the tire. It also may form pockets between the plies and separate them If this condition becomes extreme, a blister forms which is visible on the outside of the tire. The cords are not broken but the plies have separated one from the other—and an accident is just waiting to happen. The trick is to develop improved inner liners that serve as a barrier between the air and the tire and are better at holding air. A tubeless tire is really a misnomer, as far as Bajer is concerned. It doesn't have a separate tube, since the liner seals only the tire, but it's a tube by any other name.

A tire is built of many diverse bits and pieces. There are bead wires, flippers, plies, cushion strips, inner liners, thread caps, belts, side walls and what have you. It's all bonded into one unit—a tire. Then a lot of trouble is taken to decouple the tire so that the tread and the sidewalls will act as independently as possible. This way the tread can hug the pavement while the sidewall is the source of the absorption characteristics: it takes care of the tire deflection. Decoupling is like an added stage in the suspension. The car's suspension decouples each wheel from the body, and now we want the tread movement to be isolated as much as possible, for traction and suspension considerations.

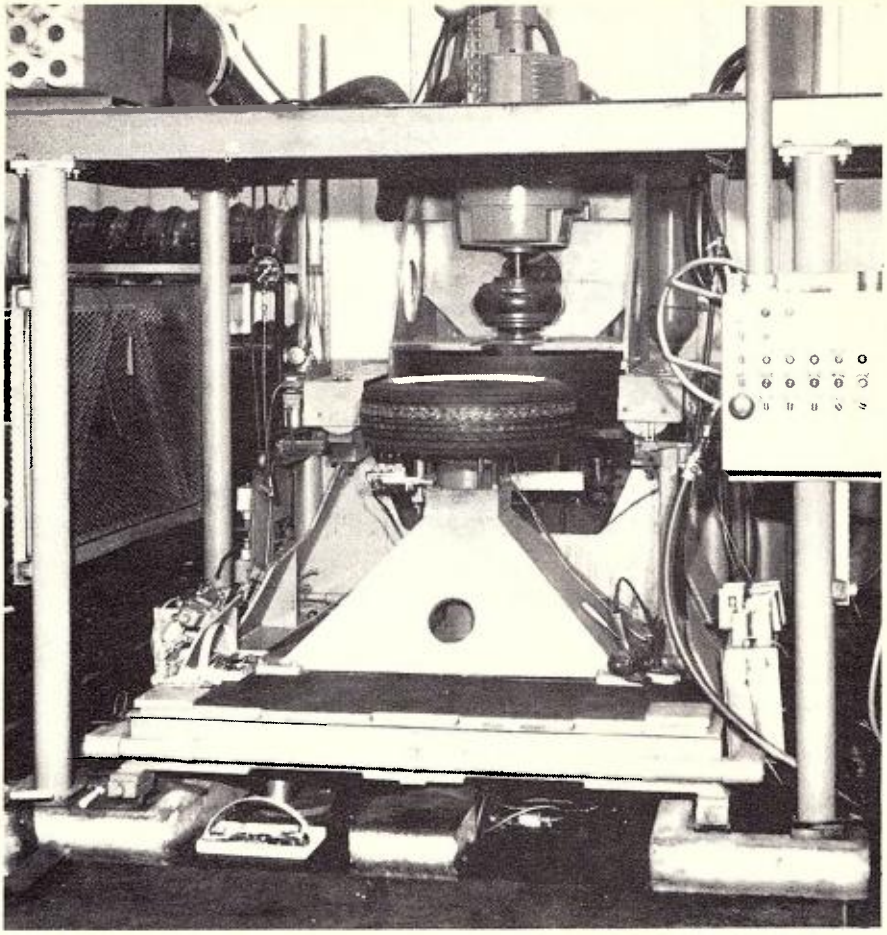
The radial tire achieves a large measure of decoupling by making the sidewall extremely flexible and the tread rather rigid (this results in the bulging sidewalls you have seen). Radials also have an advantage over bias ply tires in terms of "squirm." The cords in a bias ply tire go from side to side at an angle with successive layers forming a criss-cross pattern. Large parts of the tread are disturbed ahead of, behind and within the tire patch as

tread goes from round to flat and back to round again. This squiggling and squirming within the tire and between the rubber and the pavement causes both tread wear and heat buildup.

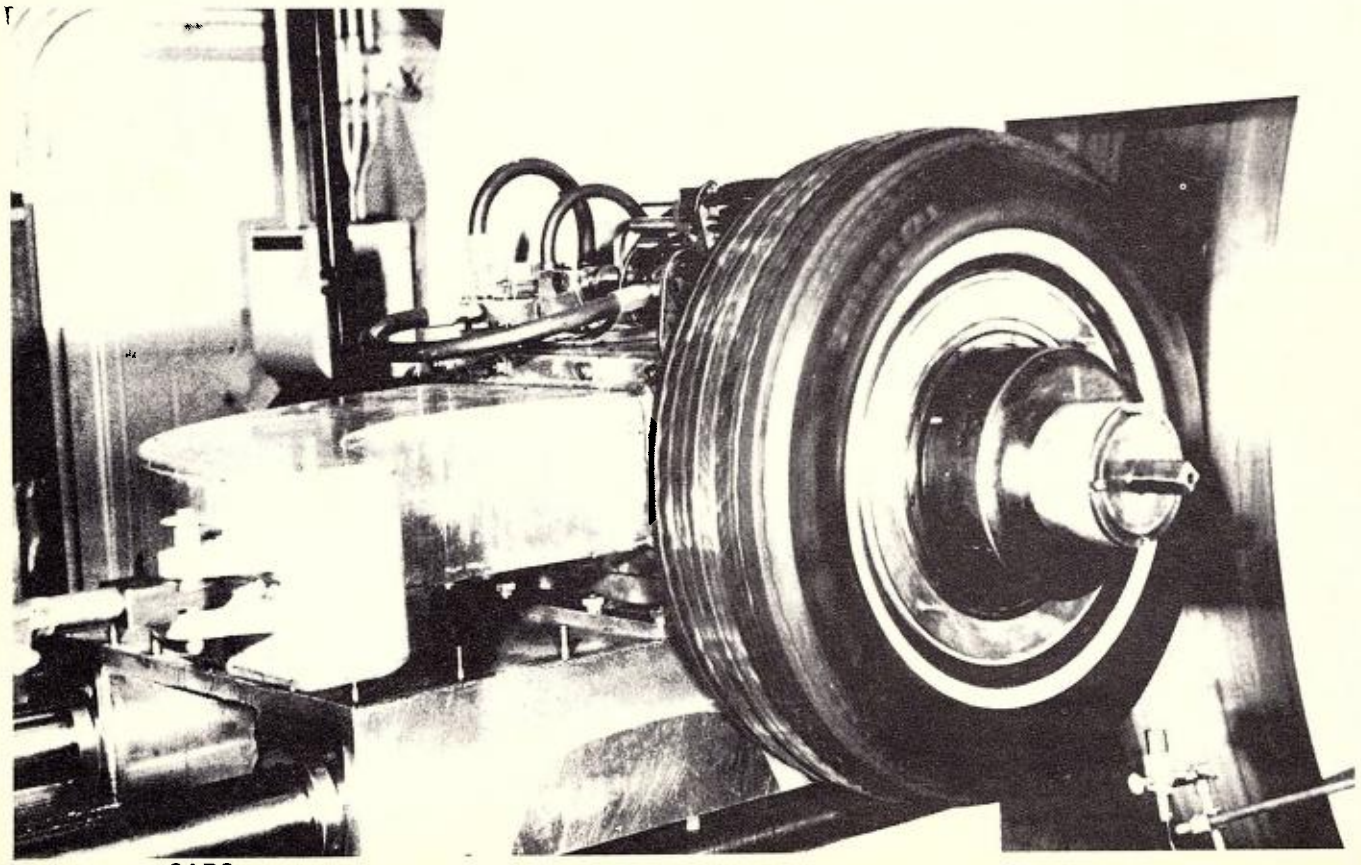
Back in the early sixties and late fifties, while Jacques Bajer was still working at Ford, radials were not looked on with great favor in Detroit. The primary reason was that they tended to induce some high frequency booming noises into the car, particularly in the 35 to 50 cycles-per-second range. Bajer did elaborate analysis of the frequency densities in various ranges and in different planes of the vehicles. While the radial was quite good in both vertical and side-to-side directions it made itself felt more violently in the fore-and-aft-plane. By asking the tire enough questions and studying its answers, cures were found. Now when you see radial tuned suspensions from one of the big three, designs that allow ample fore-and-aft compliance to isolate the car from the tire, you're seeing some of the results of Bajer's early basic research.

For present-day research at Uniroyal, they've built a machine with a road bed 40 feet long and 16 inches wide to study tire patch forces while the tire is actually traveling. The transducers in this machine feed the information they pick up into a computing system. Much study has been done on the effect of the entire patch at once, the forces and moments it generates as a whole; this machine allows

(continued on page 63)



The uniformity testing machine above reads forces generated by the tire as it turns against the drum under load. It relates the information to the position of the tire at various stages of its construction. Below is a device designed for tire sound testing. Different pavement surfaces can be simulated on the drum, with the changing noise spectrum picked up by the microphone.



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Rolling advertisement: Owner John Torreta is now in the pinstriping business.

MIDNIGHT SPECIAL

Car for the stars

BY RICH CEPPOS

PHOTOS BY ANDY LA CORTE

JOHN TORRETTA DOESN'T wait around for his dreams to come true. He makes them happen. And his 1963 Chevy II is rolling proof of what a person can do with little more than his bare hands and a heap of desire.

"I bought the car in 1975," says Torretta, who graduated from high school in June of '76. "It was partially finished but the body was in bad shape. It was in primer and the rocker panels and lower rear quarter panels were rusted out. I had to cut them out and rivet-in sheet metal replacements. Many of the areas filled in by the previous owner were cracked. I practically had to start from scratch."

This wouldn't be much of a hardship had Torretta been a professional bodyman or even an experienced amateur with a well-equipped tool cabinet. But he was only a 16-year-old high school senior with virtually no bodywork experience and no tools.

"I really had nothing to work with. I just used what was around. I used a wooden board and sandpaper to smooth the flat surfaces. For the rounded areas, like the flares, I used a rubber hose wrapped in sandpaper."

As you can surmise, doing heavy bodywork with such rudimentary tools wasn't the fastest way to get things done. "Boy, those flares," Torretta recalls with a smile, "they took forever. I spent weeks just filing and sanding until I got them just the way I wanted them."

Once the heavy work was done Torretta covered the Chevy with GM black. Then came the details, like the addition of a power antenna, fog lights and all new chrome—no small feat in itself when you realize Torretta was working on a 13-year-old car at the time.

But bodywork was only one of the things Torretta wanted to learn. "I also did all of the pinstriping, lettering and flames on the car. It was the first time I'd ever done that kind of thing. I practiced with a brush for months down in my basement before I tried it on the car."

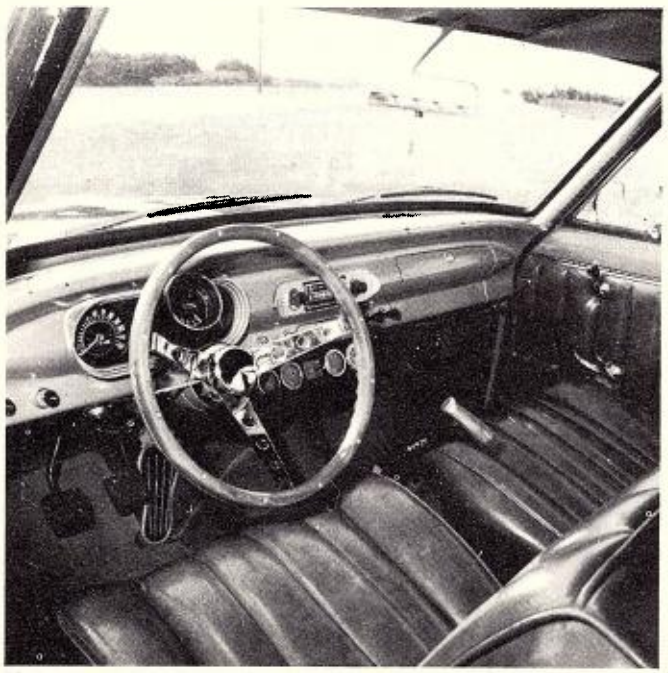
Besides doing all of the bodywork, Torretta also had to struggle through a drivetrain rebuild—something he could easily have lived without.

"Luckily my dad knows a lot about motors. He helped a lot. When I was putting in the rear-end, he was under the car with me.

The drivetrain was shot when we got it. We took the heads off, rebuilt them, checked out the lower end and put it all back together. Then I had a set of custom multi-leaf springs made to replace the stock mono-leafs, and we put them and a Camaro 12-bolt rear in."

The motor started life as a '65 Vette 327. It had been bored out by the previous owner to 331 cubes and fitted with TRW 12.5:1 pistons. A pair of LT-1 heads with 2.02-inch intakes were bolted to the 4-bolt-main block. An Edelbrock manifold sits atop the engine and distributes the fuel mixture provided by the Holley 780-cfm carb. The original Hooker fenderwell headers had become rusty and were replaced with a fresh set. Torretta bolted them up to a pair of Walker mufflers.

(continued on page 66)



Naugahyde interior features sun gauges and S-W tach.

Motor is strong 327 Chevy with fuelie heads and Z/28 cam.

WALK SOFTLY. . . AND CARRY A BIG SIX

Our six-gun from Dodge City takes to the street

BY RICH CEPPOS
PHOTOS BY JEREMY YOUNG

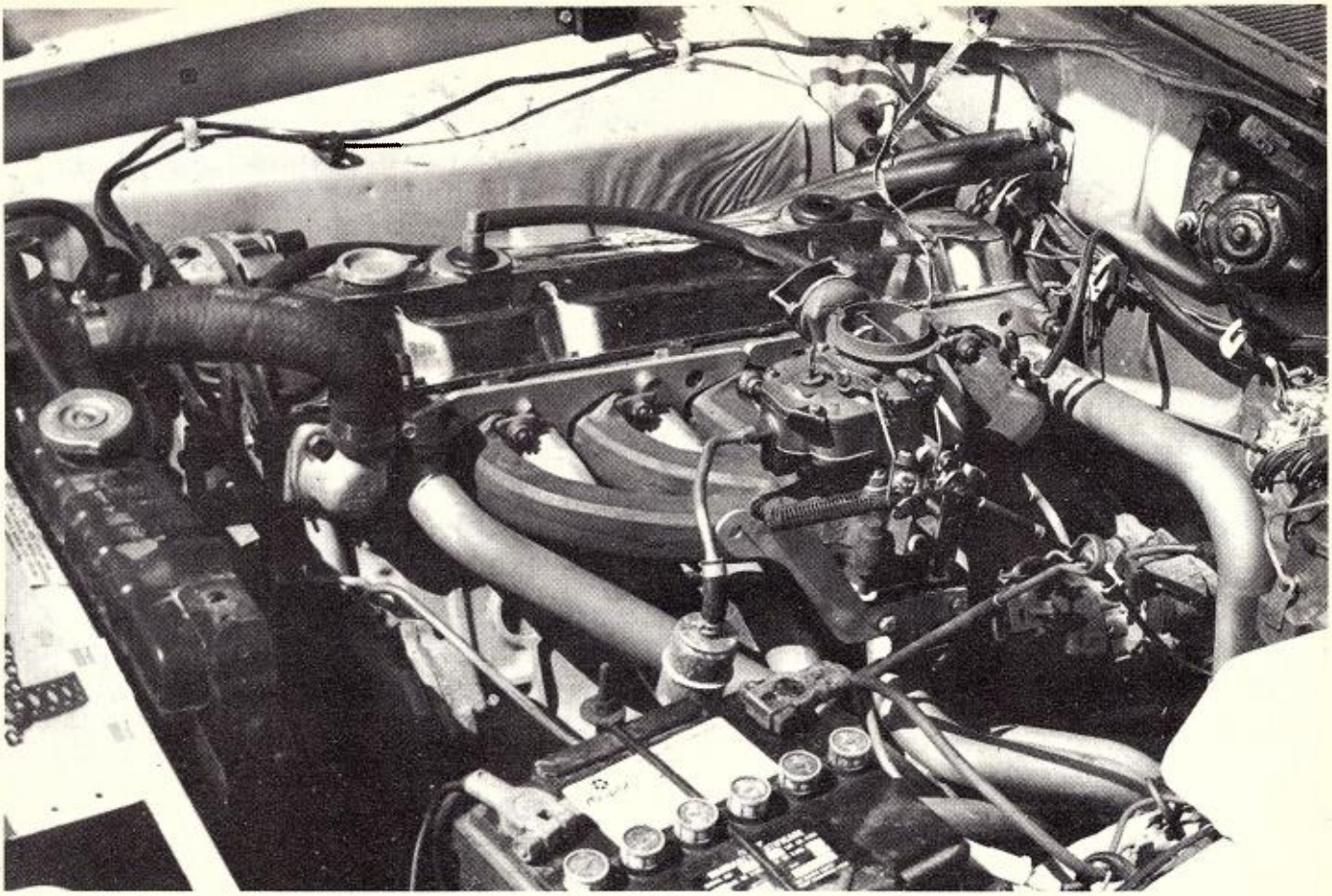
OKAY, WE MIGHT AS WELL come clean. We told you we were going to build Dodge's Lite into the ultimate street strip/economy car. Well, we couldn't make good on our promise. We're guilty, but with explanation.

To refresh your memory, the object of this project was to take the Dodge Lite and make it as quick as possible on the strip without sacrificing tractability or giving up too much of its 36-mpg economy. And we wanted to do it in a way that could easily be duplicated by the average enthusiast.

So we brought the Lite to well-known Mopar doctor Joe Jill at Speedwin Automotive and told him to breathe new life into the patient. That he did, focising on the Lite's most offensive organ: its econo-tuned, taxi cab, slant-six motor. The sickly motor was removed from the car and intensive open-block surgery was begun. The block was decked to increase compression and all internal parts were clearanced and balanced. The key to the patient's speedy recovery, Jill realized, was all in its head—so that's where he directed most of his attention. In the interests of deeper respiration, the head was ported and polished, combustion-chamber volumes were equalized, larger valves were fitted and a multi-angle valve job was administered. To make sure that the patient was adequately fed, a Carter 2-barrel carb was fitted in place of the standard 1-barrel, and a Racer Brown medium-grind cam was slipped into the block. A set of Hooker headers was bolted on to scavenge any impurities in the Lite's system.

Corrective surgery was also performed on the Lite's weak-kneed drivetrain. The Lite was hobbled by an economy-oriented 2.94 rear axle ratio and 4-speed overdrive transmission (essentially a 3-speed with a 1:1 third gear and a .73 overdrive fourth gear). Dr. Jill amputated these parts and refitted the Lite with a close-ratio crashbox with Hurst shifter and a Duster-V8 rear-end equipped with 5.38 gears. The transformation from anemic weakling to healthy, well-muscled supercoupe was completed with the addition of a pair of Direct Connection rear springs, sticky 9-inch-wide Goodyear slicks at the rear and skinny rubber up front.

The responsibility for the final phase of the Lite's recovery was turned over to Speedwin mechanic/racer Joe Collazo. After completing a thorough exercise program and receiving some careful out-patient tuning at the track,



Half-dozen to go: super-six features 2-bbl. carb, racer Brown cam, much head work.

Sitting pretty: only exterior mods were handsome Western wheels and fat BFG T/A tires.

This is the end of the Lite most supercar drivers will see unless they're very sharp.

Only changes to interior were Hurst linkage, Sun tach (not shown).

the Lite was pronounced healthy enough to kick sand in the faces of embarrassed small-block V8s. And that it did. Lunging out of the gate at 6400 rpm and shifting at 6000, the Collazo-driven Lite consistently howled through the quarter at times hovering around 15-seconds—with a best run of 14.97 seconds.

But now that we had turned the Lite into a mini-motored version of the Motown Missle, it was necessary to back off a notch. Our ultimate street/strip/economy car had to be capable of transporting you in relative comfort and economy—something the Lite couldn't do if that trip included any highway driving. The 5.38 gears had the motor screaming for mercy at highway speeds. But not only does churning along at 4000 rpm at 60 mph hurt gas mileage, it makes your ears throb in very short order.

The logical thing to do would have been to re-install the overdrive transmission, sacrificing some straight line performance for more relaxed cruising and better economy. (The overdrive's .73:1 ratio would reduce the 5.38 rear-end ratio to 3.93 in top gear.) But we didn't do that. Why? Well the story goes something like this:

Open with a shot of the Lite, in full race ragalia, sitting in a corner of Speedwin Automotive's vast shop. Cut to the *Cars* office where Managing Editor Jeremy Young is lying on the floor, semi-conscious. He is being ministered to by Betty Blondhead, one of our secretaries. I have just returned from a short, seven-hour lunch.

Betty: Oooh Rich, am I glad to see you. These smelling salts don't seem to be working too well.

Rich: What happened?

Betty: Jeremy has been unconscious since the Dodge public relations man called and told him they wanted their Lite back. He doesn't know how we're going to tell our readers we didn't have enough time to finish the project.

Jeremy: Moan.

Rich: I wonder why they want the car back? We're only four months behind schedule with the project.

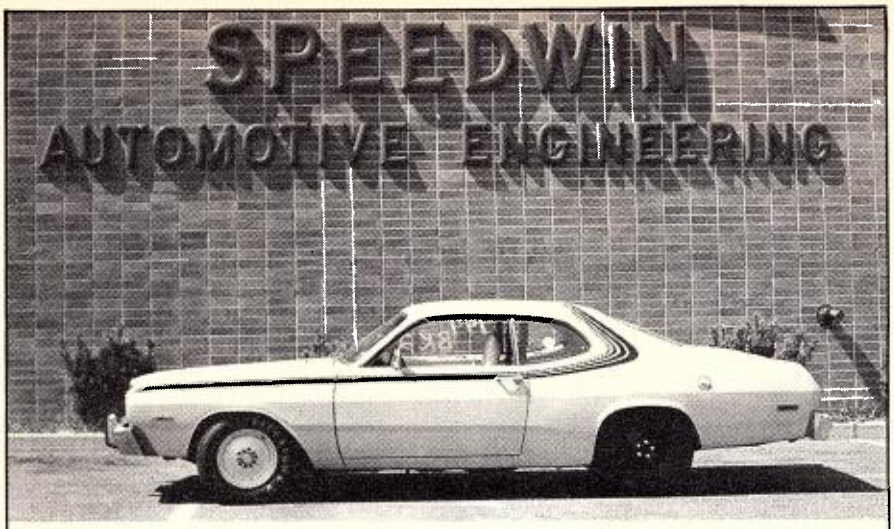
Betty: Well, what *can* we do?

Rich: I don't know. We're going to have to do a real good tap dance on this one.

Jeremy (leaping to his feet): That's it, Rich! (Beginning to dance) Just ease the truth by 'em with some fancy footwork—tap, tap, tap—a couple of sharp turns—tap, tap—a big smile and a tip of the hat as you soft-shoe off stage. Betty, throw me my top hat and tails!

We send Jeremy off in the direction of the nearest bar to calm his nerves.

A couple of days later the Lite was safely back in Detroit. But before it left we had just enough time to slap in the original overdrive box and stock 2.94



HOMEMADE SUPER-SIX

WHETHER IT'S FOOD, drink or cars, it always seems better when it's made at home. That home-style touch means you can have it exactly the way you want it—and it'll probably cost a lot less than store-bought, also.

The Super-Lite's engine is a case in point. If you wanted Speedwin Automotive Engineering to duplicate our Lite's motor, you'd have to cough up $275 for head work and $850 for all the machine work done to the block, or a total of (gulp) $1125 for labor. Do away with the majority of trick machine work (porting and polishing the head, installing the big valves, blueprinting the block) and you'd save yourself a fortune. Joe Jill informs us that with just the bolt-on goodies, a head cut of .060-inch and a radius-angle valve job the Lite will run *real* good.

In fact, if we come across a low-mileage, grandmother-owned Valiant for sale, we just might build ourselves a super-low budget sleeper—just to keep you guys honest.

The pieces: Except where otherwise indicated all of the good pieces that went into our Lite came directly from the Direct Connection catalog.

pushrod kit (p 3690988)	$ 4.25 (each)
windage tray (p 3690274)	8.04
cam & kit (p 3690766)	130.50
valve springs (p 3412068)	2.75 (each)
intake manifold (2806816)	65.71
2-bbl. carb (3462779)	47.56
rear springs (p 3690458)	54.11 (each)
rear shocks (3400960)	22.90 (each)
exhaust valve (from '57 Dodge V8)	3.00 (each)
Intake valve (from '57 Hemi)	3.00 (each)
8¾-inch rear-end. (from junkyard)	75.00
4.86 gears (from speed shop)	135.00

rear-end. And to spend a couple of days on the road getting to know our creation a little better.

From the first turn of the key we knew we'd like the Lite; it responded with a purposeful snarl. Though it idled as lumpy as a race car, it proved to be as docile around town as a stocker. It inched through colossal traffic jams, never missing a beat or fouling a plug. The only hint that there was something hotter-than-stock under the hood came from the increased engine noise—due to the tube headers and lack of an air cleaner. But out on the highway there was no mistaking this for any standard Lite. In any of the lower three gears, each movement of your right foot produced positive, very un-six-cylinder-like rush of acceleration. It was acceptably quiet for a weekend warrior, too. Top gear, as we reported in our first article, was still only good for land speed record attempts. The motor labored in fourth at anything less than 60—unless the terrain was as flat as the Bonneville Salt Flats.

The new Lite's ride and handling were little different from its stocker days. The stiffer Mopar springs and rear shocks had no discernable effect on the car's over-the-road behavior. It still could get you to the strip without shaking your fillings loose or wallowing off the road into a guard rail. But it also retained its vague, numbed road personality. And though there was no difference in how the Lite handled, you had to drive it a little more cautiously over undulations. Otherwise, you would surely scrape the low-hanging exhaust header.

Though the Lite's road manners haven't changed much, its behavior around the gas pumps has. Because its compression was raised, it now sticks its nose up at unleaded gas and demands more expensive high test. And its increased vitality demands more firewater than before: We recorded a high of 22.5 mpg on the highway as compared to 31 when in stock condition. But considering the increase in performance, that's a difference we can easily live with.

The most endearing characteristic of the Super-Lite is not that it can sidestep gas pumps, or that it will get you places without torturing body or soul, or even that it can blow the mags off all but a handful of current Detroit sporty cars.

No, the Lite's forte is its ability to deceive. Perched on its tall and narrow D78-14 tires—with full hubcaps, no less—the little Lite looks as innocent as the thousands of other grocery-getters of its genre. Even the most ardent street racer will dismiss its lumpy idle as just another junk motor in need of a tune-up. But by the time the guy in the 'Vette realizes just how serious the Lite is and opens all the holes, you'll be over the horizon.

The Lite's power was so impressive that we arranged an impromptu race between it and the 1976 Performance Car of the Year—the Trans Am 400—to see just how well it stacked up against the company champ. The Trans Am—still stock—was equipped with the same 4-speed wide-ratio box and 3.08 rear gears it had recorded 16.64/85 quarters with.

To eliminate the variable of starting line technique, we ran the cars from a fifteen mile-per-hour roll. The Lite held off the Trans Am through first gear. In second, the Trans pulled even and then edged away. By the shift to third (at about 80 mph) the Trans Am led by only a car length.

That's how the Lite did in a heads-up race. But heads up racing isn't what the Super-Lite is all about. It's a stoplight con artist whose quiet exhaust and nondescript looks and conventional stance will lull the competition into a false sense of security. And by the time they realize what hit them you'll be halfway to the next state. And

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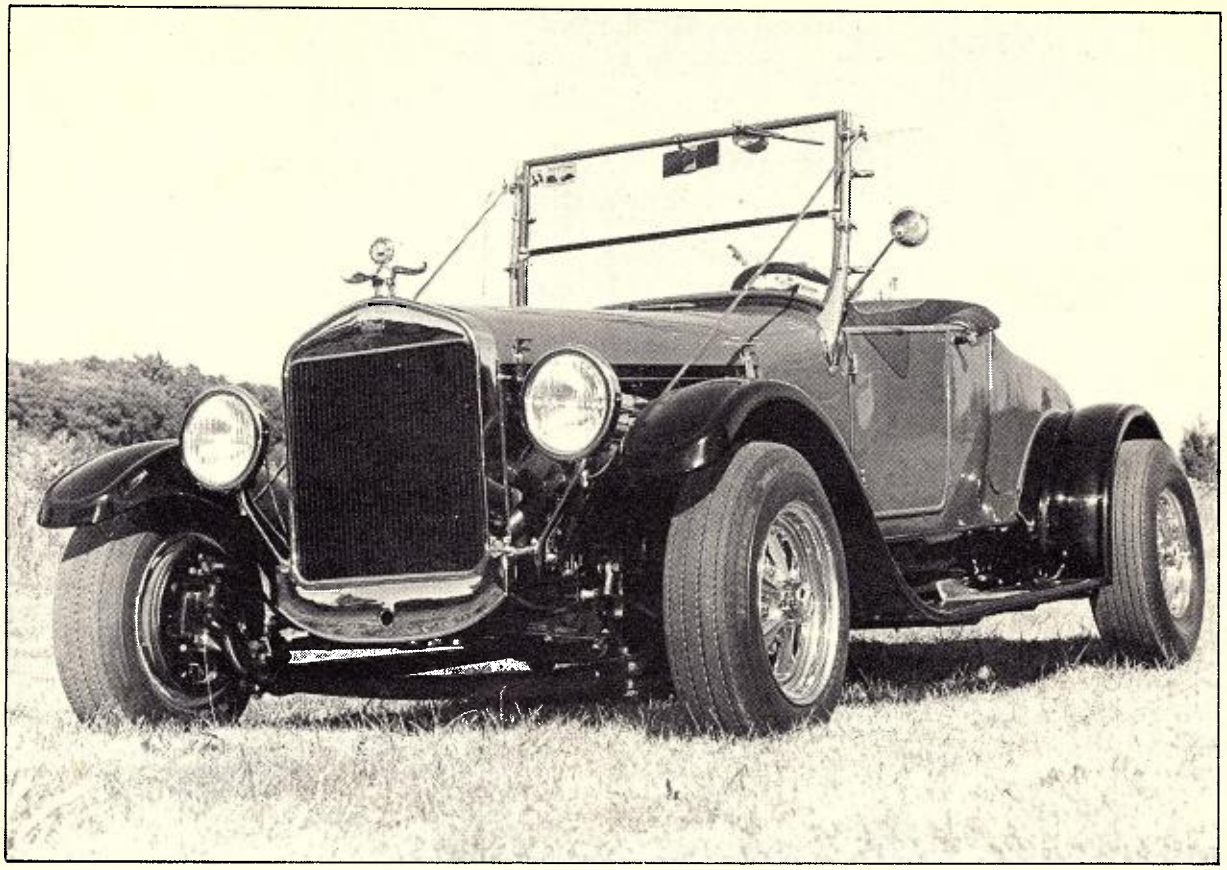
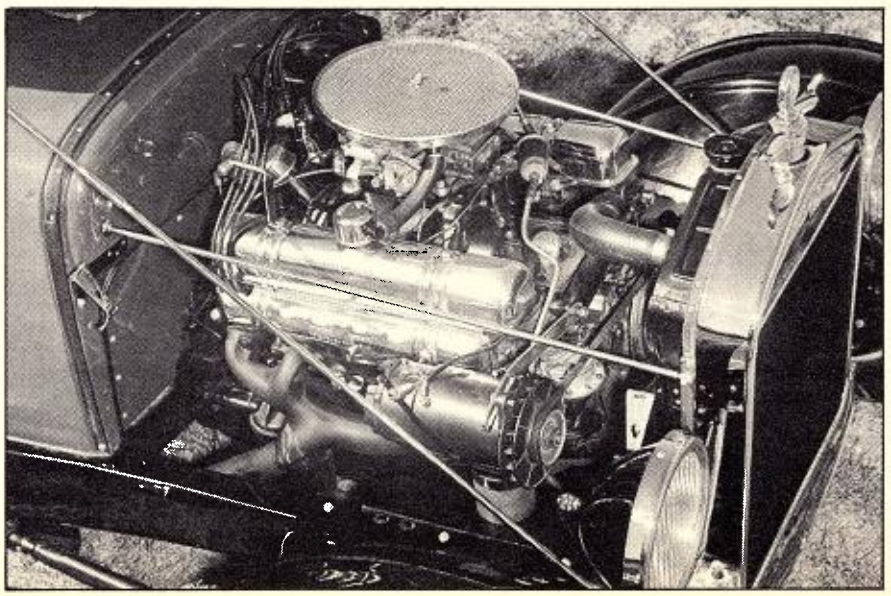


HOMEBREW BUCKET

Bill Bufka's roadster is a blend of well-aged Ford and Buick ingredients

BY ROBERT HEGGE

The motor is classic hot-rod power: a Buick. The 322-incher is stock except for Holley carb.



WHEN YOU'RE A 25-year-old machinist who has been building plastic car models since the age of eight, there comes a time when you must move on to the real thing. For Bill Bufka, Jr. of Fenton, Missouri, the real thing is the 1927 T-roadster pictured here. He did 95 percent of the work himself—all but the pretty interior stitching done by his good friend Wayne Crump. Construction required 18 months and an investment of $3000, which includes the car's original one-grand price.

Bill based his street rig on a 1932 Ford frame with the front and rear horns removed. The '32-vintage suspension was retained, but the pieces suspended are from all over.

Up front a '31 Ford axle with four-inch drop sports '37-'48 Ford spindles, '40 Ford drums and MG shocks; a VW stabilizer unit was added for tighter control. Steering is handled by a '64 Corvair box while the driver handles a classic T-model steering wheel. And in the rear, special mounts had to be welded to the suspension to accommodate the '51 Olds rear end and short tube shocks. The 3.41 gears get power from the stock Olds three-speed via a 41-inch driveshaft.

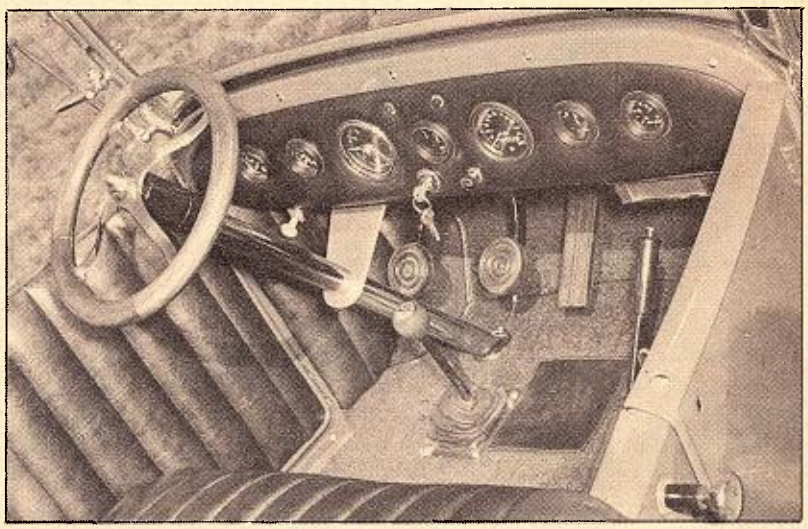
In the motor department, this Missouri enthusiast decided to remain moderate: he chose a '55 Buick V8 with 322 CID. Little was done to the mill except for a minor overhaul to be sure everything was running A-OK. Bufka added a 565-cfm Holley four-barrel and a 13-inch stainless steel flex fan, and bolted her up to the Olds transmission, which proved to be a no-sweat mate-up. The headers are the stock Buick items.

The T-bucket body is the real steel thing, and Bufka knew to leave well enough alone. The turtledeck rear, however, is a fiberglass item. The pair of Austin-Healey hinges, MG lid latch and gas filler neck are nice touches, clean and understated. The taillights are the coveted '39 Ford blue-dot type.

Up in front the steel hood required the addition of ten more inches of sheet metal, which Bill did himself. Headlights are stock Henry F. design, as are the graceful fenders and running board which are usually scrapped in a hot rod job. The body was sprayed in Balsom Green and black lacquer by DaWain Lawham of Fenton, Missouri. Chrome work on the radiator shell, headlight standards and various engine mounts is to the credit of Theiss Plating in St. Louis. The rod rolls on a set of Cragar SS wheels which mount Remington and J.C. Penny rubber.

The interior benefitted greatly from Wayne Crump's fine stitching of the dark green naugahyde. The neat layout of Stewart-Warner gauges is set in a padded dash; gearshift is a home-fabricated stick. Bill's got his sounds along, too, with 8-track and FM on tap.

The builder will be the first to tell you that the car was built with little else in mind than attending the many rod runs in the midwest. But as an added bonus, this attractive car has turned out to be a winner at various car shows in the area. Awards won include four Firsts, one Second and a "Best Homebuilt." Not bad at all for a first-time project. Bufka drives it to all sorts of meets, and he's found that it performs well in any type of weather, on expressways and back country roads. It never gives any trouble and it's fun to drive—because its builder took some trouble in putting it together.



Top: T-bucket body is steel, but turtle-back rear deck is 'glass. Bottom: interior is only part of rod owner Bufka didn't do. It features S-W gauges, a wood wheel and homemade stick.

NASH THRASH

Hopping the surprisingly responsive AMC V8

BY ROGER HUNTINGTON

IN THE LAST three or four years the American Motors' compact lines—the Hornets, Gremlins, and more recently the Pacer—have caught on in the youth market. We get a surprising number of letters from readers wanting information on hopping up the late AMC V8 engine, so we felt it was about time to review the performance possibilities of the basic AMC V8 design.

The late V8 design was introduced in 1966, and has been available since then in displacements of 290, 304, 343, 360, 390 and 401 cubic inches. The last year for the big 401 was 1974, and even the 360 was phased out after the '76 models, leaving only the 304-cubic-inch size for the '77s. The 401-cubic-inch size has been around for years, but has been used in the heavier models that are not popular with the youth market. The 390 size was phased out in '69, so you don't see those around much. The 360's are quite plentiful. Only the 304 has been available in the compact models in recent years, so this is the size you'll probably run into the most.

These engines are all of the same basic design, and many parts are interchangeable. It might also be mentioned that cylinder block deck height was never raised after 1970, which helps on interchangeability of intake manifolds and connecting rods. It's a pretty good situation for parts swapping. And of course there's a fair supply of junkyard hardware to help you along:

CYLINDER BLOCKS

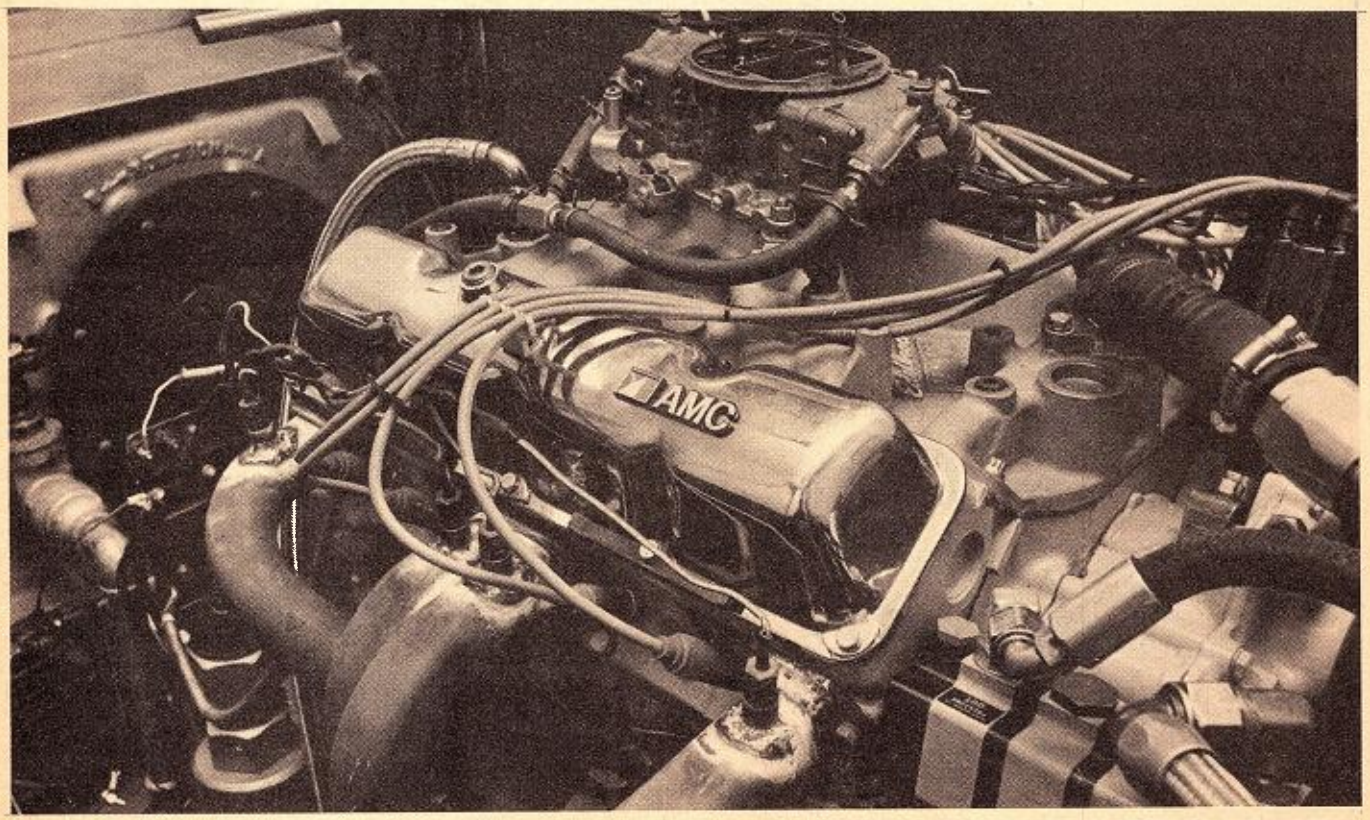
The motor mount bosses are the same on all the blocks, so different size blocks can be swapped from model to model just by bolting them in. A 360 block will fit a late Hornet or Gremlin that originally came with a 304. Since AMC engines are inexpensive and plentiful in the junkyards, it's practical to buy a complete engine and make a swap like this. The 360's are the easiest of the larger sizes to find. The larger-size block can be adapted to the compact transmission and drive line with factory parts or parts that come with the engine from the salvage yard.

It should be mentioned that the block deck height was raised slightly in 1970, so intake manifolds and pushrods won't interchange across that year. But this wouldn't effect the installation of a complete engine in a car, as the increase in engine height and width is very small.

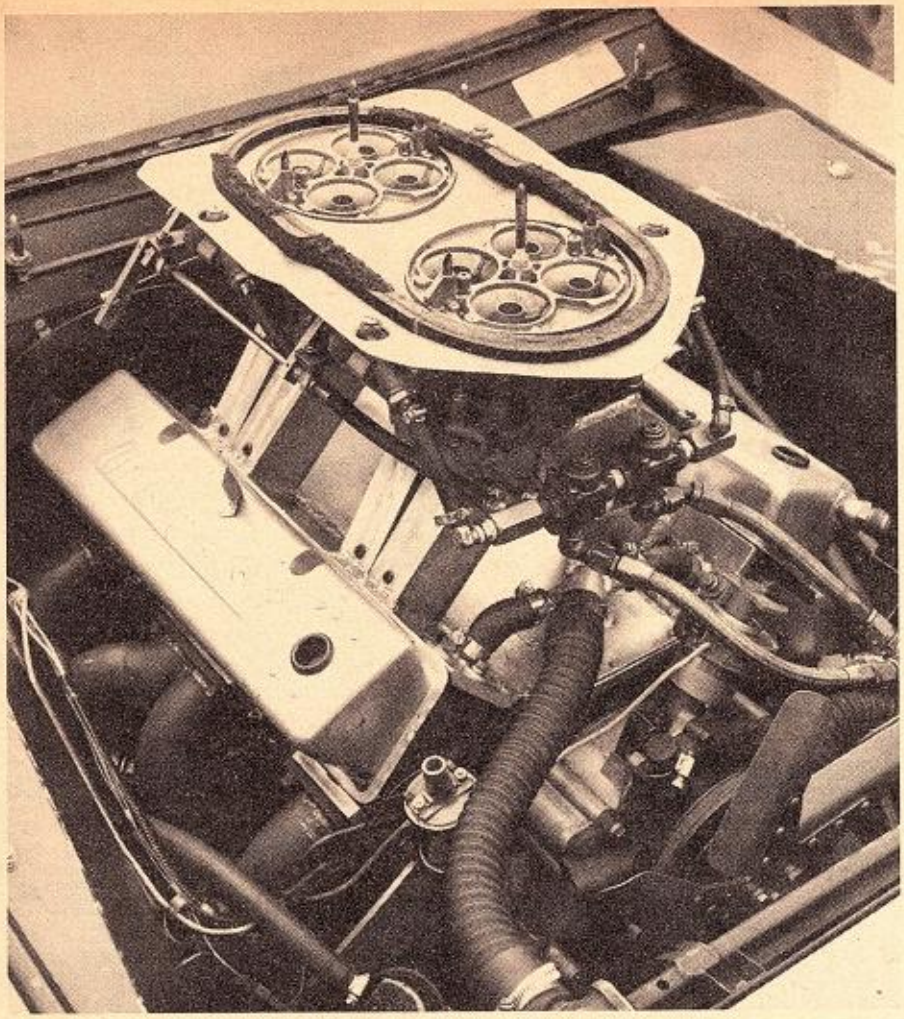
CYLINDER HEADS

AMC engineers have patterned the design of their cylinder heads very closely after Chevrolet small-block heads, especially in intake port design. And I'm happy to report that the AMC heads flow just as much air as the Chevys in stock form—which is saying a lot. The big-valve versions have plenty of flow capacity to pull 400 horses or more in a practical street engine. Don't be afraid of investing in an AMC engine because you don't feel the performance potential is there. It is. Like any other engine, it's a question of the combination of parts. The heads can do the job.

Like Chevrolet, AMC uses the same intake and exhaust port configuration in all their heads for the different engines. The only difference is in valve size: Heads for the 290-304 engines use 1.78-inch intake valves and 1.40 exhausts, where heads for the larger sizes (343 and up) use 2.02-inch intakes and 1.68 exhausts—about the same size of Chevy's high-performance small-block heads. As



Roger Penske's team was sponsored by American Motors in the early '70's in a major and successful NASCAR effort. The 355 cu.-in. AMC engine used an Edelbrock Torker manifold, 830-cfm Holley and developed nearly 500 horsepower at 7000 rpm.



Dave Kanners is doing well in Pro Stock with a radical AMC engine featuring fabricated heads with ports twice the stock area and a manifold with runners fabricated from sheet aluminum. He turns 8.70's at 155 mph at legal NHRA weight.

mentioned, all the AMC's port sizes are the same.

An important change in exhaust port design was made in 1970. The port opening was changed from a rectangular to a "dog-leg" shape, and the port floor was re-contoured for smoother flow. This increased exhaust flow by 50 percent, which helped the overall breathing by more closely matching intake and exhaust flow. (One of the secrets of the good breathing of Chevy heads.) Thus you will always want to use '70 or later heads where possible.

There's also the matter of combustion chamber volume. Early heads had 51-cc chamber volumes, but this was increased to 58-cc's in mid-1971 to lower compression ratios for unleaded gas. If you want to use stock flat-top pistons you will need the early 51-cc heads to get good compression. If you're switching to special domed aftermarket pistons it won't make any difference. The late 58-cc heads breathe as good as the early heads.

It should also be mentioned that '69 and earlier heads used 7/16-inch head bolts, where late heads use ½-inchers. If using late heads on an early block, AMC recommends using special spacer dowels in the two end bolt-holes to maintain alignment. These are available under part number 8122492.

Is it better to use the small-valve heads on the small-cube blocks, even after you have improved the breathing with extra carburetion or a hot cam? There is some controversy on this, but the consensus seems to be that the big-valve heads would work better on the small-block (304) if the breathing has been improved substantially. Don't use them otherwise. You need good air flow and a fairly stiff axle gear to really get the full benefit of the big valves on a small-cube block. It's the same as using the medium-size 1.94-inch intakes on a small-block Chevy street engine. They seem to give better response than the big 2.02-inch valves for most applications, unless you have radical mods and a stiff gear. The small-valve heads should work better on the 304 block for milder hop-up jobs.

CARBURETION

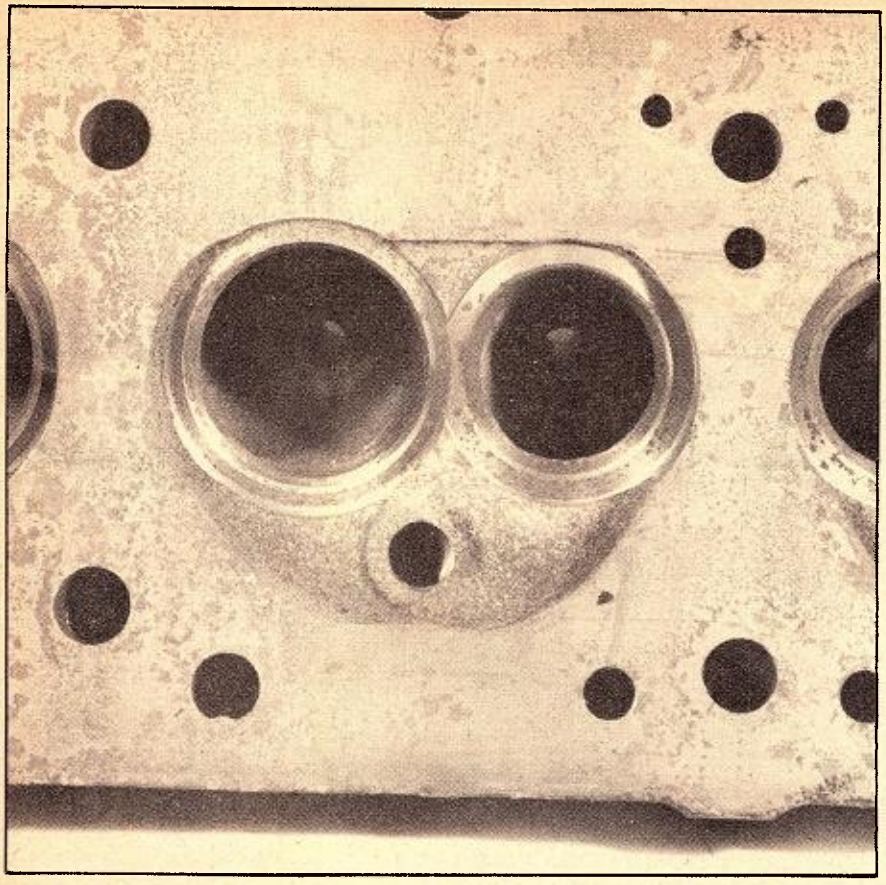
AMC never provided much in the way of free-flowing factory manifolds for their V8 engines. Fortunately, there are several good aluminum designs from the specialty suppliers that should meet most needs. Edelbrock has a two-plane hi-riser type plus a single-plane X-type "Torker" design, both flanged for the Holley bolt pattern. Offenhauser offers single-4-barrel versions of their "360-degree" Equa-Flow and Dual-Port configurations in either the Holley or Spread Bore bolt pattern, plus a dual-4-barrel Equa-Flow.

In selecting an intake manifold for the AMC V8, keep in mind that the port flange bolt pattern was changed slightly in 1970, so '69 and earlier manifolds will not interchange with late designs. Offenhauser supplies their special manifolds for both bolt patterns, but Edelbrocks are only available for the '70 and later pattern.

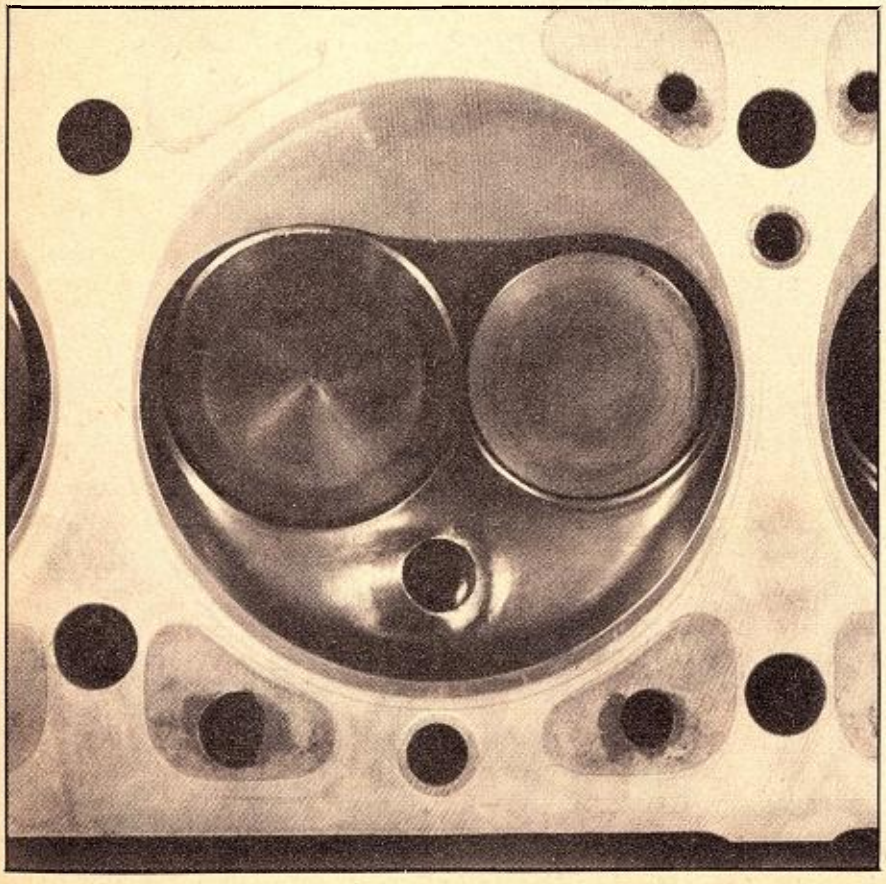
The small-cube blocks (290-304) should work best with manifolds that have good low-end characteristics, like the Edelbrock two-plane hi-riser and the Offenhauser Dual-Port. In fact, we would recommend these manifolds for milder street versions of the bigger blocks also. The Edelbrock Torker and Offenhauser Equa-Flow should be confined to bigger blocks and more radical hop-up specs—hotter cams, free-flow exhaust, stiff gears, etc. These are essentially top-end manifolds. An Edelbrock "Streetmaster" single-plane design might be good for a mild small-cube version, but this configuration has not yet been made available for the AMC engine.

Would there be any advantage in using a stock, cast-iron 4-barrel manifold for a very mild 304 street engine? Probably not. We like the Edelbrock two-plane hi-riser for this application. It has larger passages than the stock manifold, and the careful contouring, good plenum design and lack of sharp corners give good low-speed response with no sacrifice in top-end. By the same token, the Edelbrock Torker should be superior for the bigger-cube blocks in applications where output above 4000 rpm is important.

The thing to remember when choosing a carburetor is not to go too big for the 304 block. Something like a 600-cfm Holley Type 4160 with vacuum-operated secondaries should be ideal for street applications. You want to feed that secondary air gradually, as engine speed builds up, and not open all four barrels in one big gulp. Holley 650 or 750-cfm double-pumpers with mechanical secondaries are okay for more radical engines with bigger cubes and stiff gears. An alternative might be the 650-cfm Holley Spread Bore, with either mechanical or vacuum secondary operation. Some Offenhauser manifolds are available with the Spread Bore flange. These carbs feature very small primary venturis for optimum fuel economy in everyday



The 51cc combustion chambers of the '70 and earlier heads give over 10:1 ratios with flat-top pistons; they are best for a hot street engine if you can find them. Note large valve size: 2.02-in. intakes, 1.68-in. exhausts.



The '71 and later heads have open 58cc chambers giving an 8.5:1 compression ratio with flat-top pistons. These are preferred for competition with domed pistons. Ones shown have been fitted with 2.06 intakes, opened up and polished.

street and highway driving. (You could adapt the GM Quadrajet or Carter Thermo-Quad to the same manifolds.)

The main thing to remember about selecting carburetors for the AMC engine is that it is not a "big-block" engine in any sense of the word. You don't need the biggest carb you can get, even for a wild street engine. Carburet it like you would a small-block Chevy.

CAMSHAFT AND VALVE GEAR

AMC never supplied any high-performance camshafts or valvetrain parts for their engine, so you will need to go straight to the hot rod aftermarket for all your goodies. Fortunately the specialty suppliers offer a fairly broad choice of equipment for the AMC engine. The big cam grinders offer several cam grinds for various performance needs—for both solid and hydraulic lifters—plus special hi-rev hydraulic lifters, stiffer valve springs, heavy-duty pushrods and spring retainers. There's no problem in getting the hardware you need, for the street or racetrack.

One point to remember when setting up the AMC valvetrain: They use positive-stop rocker arm studs, so you can't adjust valve lash or open up hydraulic lifters by unscrewing the stud nut like you can on Chevy engines. If you want to be able to make these adjustments (and we highly recommend it for hot street engines) AMC has special adjustable replacement studs. Ask for part number 3208572.

THE CRANK TRAIN

The AMC V8 is a pretty rugged engine in stock form, and there are no serious durability problems for street use. The crank, pistons and rods seem to be reasonably strong, and the lubrication system seems to get the right amount of oil to the right places. For rev range up to 6000 or 6500 rpm the standard bottom end should be very adequate.

For speeds above 6500 rpm some changes may be needed. For instance most AMC V8's use cast-iron rods and crankshaft. These should be swapped for forged steel pieces for 6500+ rpm speeds. These parts were forged for the 390 and 401 engines and can be interchanged in smaller blocks by using special pistons with the right pin-to-crown height to compensate for the differences in rod length. These are rather complex swaps, but they have been done. It would probably be simpler to just pick up a complete 390 or 401 engine in a junkyard, if you wanted to build up a high-revving engine that needed the forged goodies. The 390 engines used stronger rod bolts and nuts—and these can be interchanged in the smaller engines. Assemblies are available under part number 3208814.

IGNITION

AMC's new breakerless electronic ignition system that is used on most '75-'77 models is made by Prestolite, and is a good performance ignition system. However, it's an expensive system to put on an older model, and the distributor doesn't have a good spark advance curve for street performance. So it would seem most practical, where you have an older engine with a conventional breaker-type distributor, to go into the aftermarket for some type of breakerless conversion kit.

There are several ways you can go. The simplest would be to keep your original distributor using an inexpensive kit to convert it to breakerless operation, and then using another kit to modify the centrifugal spark advance mechanism to give the quick, short advance curve you want for optimum street response. (They're available in any hot rod shop for less than $10.) The other alternative would be to get a complete high-performance breakerless distributor to replace your original unit, and this would have the fast advance curve built in—possibly even an adjustable advance curve that can be tuned to the needs of the engine. If you need even more there are several booster systems you can add to a basic coil-type distributor.

The main thing to remember when planning your ignition mods is to get rid of the troublesome breaker points, add some punch for a hotter spark and make sure to do something about a fast advance curve.

THE EXHAUST SYSTEM

Since AMC cars aren't as popular in the youth market as Chevys, Fords and Pontiacs, naturally there isn't as broad a selection of special tubing exhaust headers to fit various engine/chassis combinations. But the supply is surprisingly plentiful, at least from the bigger header manufacturers like Hooker, Cyclone or Hedman. You can get bolt-on headers for the V8 engines in Gremlins, Hornets and Javelins, which is about 95 percent of the potential market. Some also supply for late Matador models.

So don't compromise on the exhaust system for your hot AMC street machine. You can mate the headers with simple header mufflers, or go into a custom undercar dual exhaust system with big pipe and low-restriction mufflers. For the AMC engines the undercar pipe should be at least 2¼-inches, with baffle-type mufflers of the type used on the Corvair Turbo models. (Most muffler manufacturers now make duplicates.)

With the right pieces you can have up to 400 honest horses for the street with one of the bigger blocks, and

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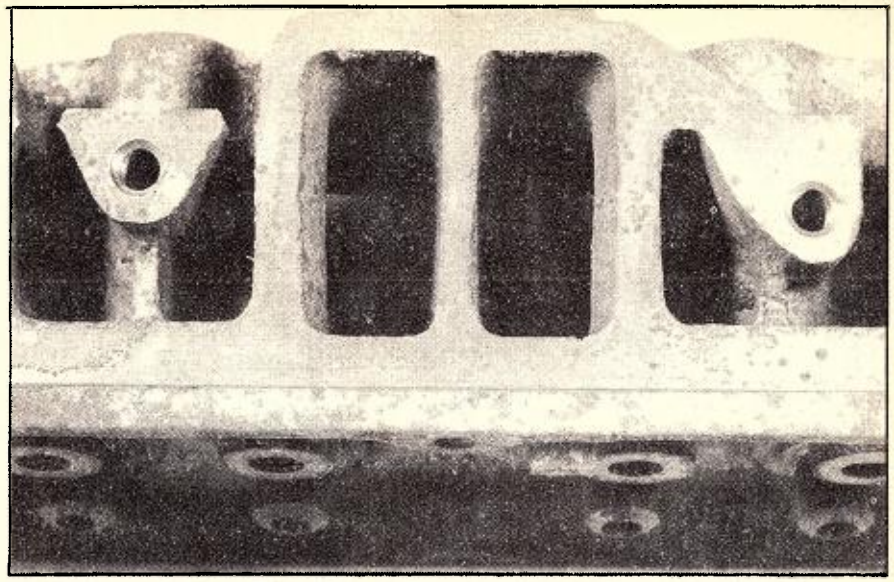
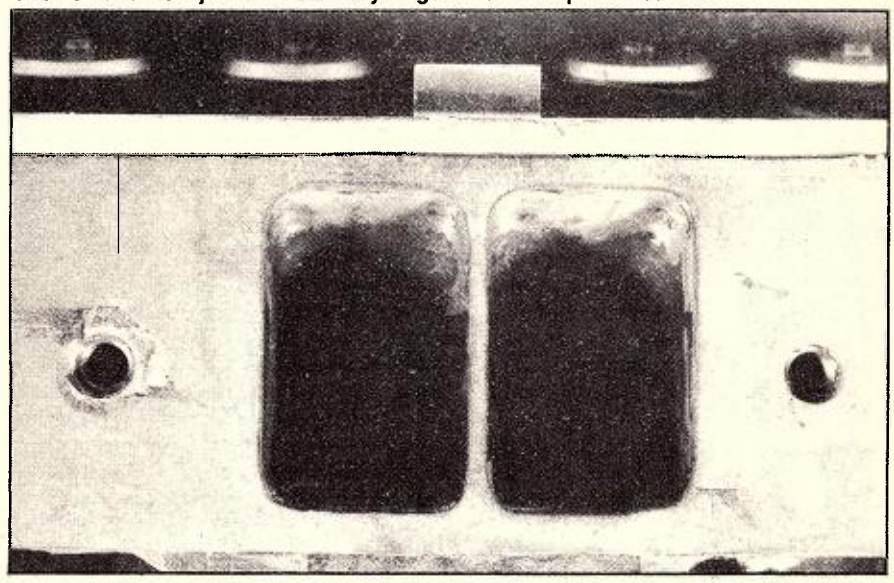
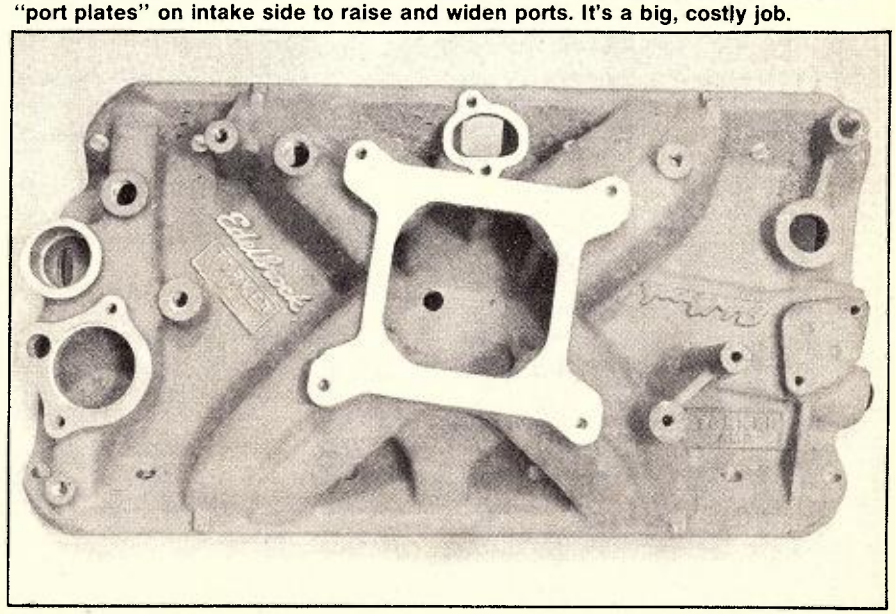


Stock intake ports are very similar in size and shape to those in small-block Chevies and flow just as well. They're good for 400 hp in street trim.



And this is what Dave Kanners does to them: these fabricated heads have inset "port plates" on intake side to raise and widen ports. It's a big, costly job.



Several aftermarket aluminum manifolds are available for the AMC V8, such as this Edelbrock Torker design—a single-plane X-type for hot street machines turning 6000-7000 rpm. A 600-cfm Holley is a good choice to go with it.

QUICK TAKE

BY ROGER HUNTINGTON

How much rebuilding does that used engine really need?

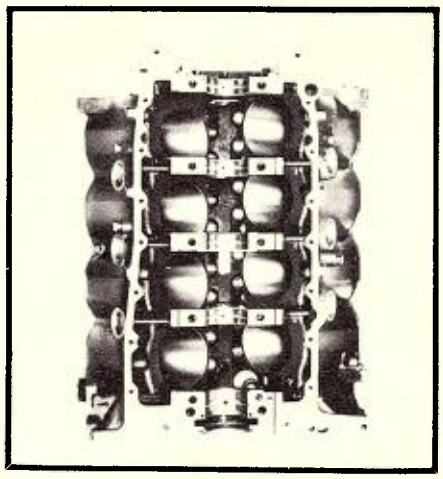
MANY YOUNG CAR FREAKS on tight budgets are forced to buy high-mileage used cars. They then face the problem of whether to go to the expense and bother of overhauling the engine. They want good performance, but it's tempting to put the money into bolt-on speed goodies rather than new piston rings, bearings and valves. Overhauling an engine doesn't increase power output. It just restores the performance to original levels.

So should you overhaul that old car or not?

If you intend to modify your engine for more performance—the usual bolt-on goodies like a manifold and carb, headers, a hot cam or ignition—the matter becomes a little more critical. That is, you'll be revving the engine higher with this special equipment, and there are higher pressures and temperatures in the cylinders. The bottom end will need to be in better shape to stand up. On the other hand, if you intend to leave the engine strictly stock, you can probably get by with sloppier internal fits and tolerances. Keep these factors in mind in your long-range engine plans.

If you decide to overhaul it, you must begin by checking that engine to see what type of overhaul work it needs. The very simplest test to make is for cylinder compression. These compression pressure figures can tell a lot about the sealing efficiency of valves and piston rings. And if there's a wide variation between cylinders, you can be sure there are special problems in the cylinders with the lowest compression.

A "low" compression ratio (about 8-to-1) should show a compression pressure of around 140 psi when you have good valve and ring sealing, and a high ratio (around 10-to-1) should show about 160 psi. This is with normal factory valve timing. With a long-duration, high-performance cam these compression figures could be reduced 10 to 20 psi. But also note carefully the *variation* between cylinders. If the compression figures vary over a spread of more than 20 or 25 psi, you have weak cylinders, and the engine needs work. Quite often you'll find just one or two cylinders that are way down on compression. But this is as bad as if they're all down.



If you find that one or more cylinders are down on compression, the next job is to determine whether the problem is valves or piston rings—or both. The easiest way to check this is to pour two or three spoonfuls of oil into the plug hole on the low cylinders, and then re-run the compression test. If the leakage is due primarily to piston rings, the oil in the cylinder will tend to temporarily seal the rings and the compression pressure will come up. If the compression doesn't come up when the oil is added, it's a sign the valves are leaking, since the oil would have little effect on the sealing in the valve seats.

Be sure to run this compression test before the engine is torn down because it's really quite hard to tell whether valves are leaking by looking at them. The seats have to be in terrible shape before you can see much. It's the same with piston rings. The compression check is a very efficient way of checking this sealing efficiency.

But now let's say you've determined the valves are leaking. At this point you have to decide whether to have the valves and seats ground, and re-use the original valves, or whether to pop for a new set of valves, and just grind the seats in the heads.

You may also have to replace or bore out the valve guides. This is going to be a problem of making careful measurements with micrometers and feeler gauges. What you have to check is the clearance between the outside diameter of the valve stem and the inside diameter of the guide. This is normally .002 to .004-inch on a new engine. You can check the exact figure on the specs for your particular engine. If this clearance has opened up more than about .002-inch from stock specs, you should consider some new parts. Just a new set of valve guides might do it. But if valve stem wear is excessive you'll need new valves and guides both. And if your engine has the new integral guides, machined right in the head, it will be necessary to bore these out and use a new set of valves with oversize stems. These are available, usually in oversizes up to .030. Valve stem clearance is especially critical in a high-revving engine. Don't get too loose if you're turning 6000 rpm or higher.

And a word about valve seat reconditioning: There is no problem using the old valves, as long as stem wear has not been excessive. The seats can be sharpened up with a good grinding job. Same with the seats in the heads. But it's important here to get the right seat *width* on both head and valve. Too wide a seat won't have enough unit pressure with stock valve springs for efficient, long-life sealing. Too narrow a seat will have too much, and the seat will tend to "pound in" and wear fast.

We recommend seat widths in the range of .060 to .090-inch for everyday street engines. Ask your valve grinder to stick in this range. Those ultra-narrow .040 "racing" seats are okay for short-life engines, but they won't last 20,000 miles on the street.

Cylinder bore wear is the first thing you check inside the block. This will occur more toward the top of the bore, so the wear pattern tends to taper as it goes down. If the difference in diameter at the upper piston ring travel and the bottom is more than about .015 inch, you should consider re-boring. Also check "out-of-round," the bore diameter in two directions at right angles, since the bore will tend to wear egg-shaped. If the difference in these diameters is more than about .010 you will also want to consider re-boring.

It's obvious that you can stand a lot more wear in the cylinder bores than any place else in the engine. This is because the piston rings can expand and take up the slack. Even with .015 taper and .010 out-of-round an engine might not consume an excessive amount of oil. But there would be a lot of "blow-by" of combustion gases into

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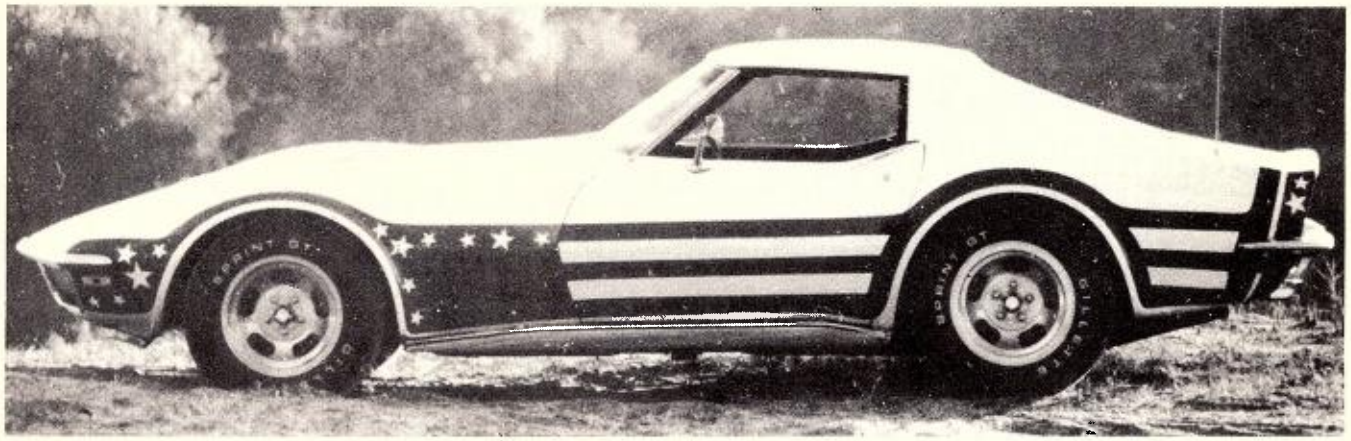
READERS' RODS

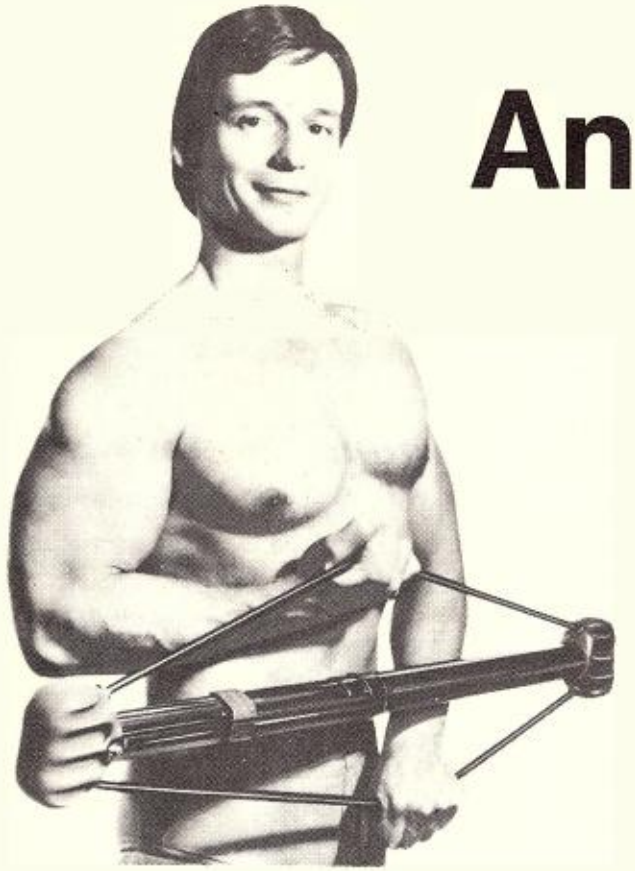
Send us good photos, tell us what you've got, and you and your wheels may achieve fame in this new section

Wesley Burmark of Tacoma, Washington, bought his '66 Shelby GT350 Mustang back while he was in college. After three seasons of autocrossing, he decided some changes were in order. Stiffer springs and swaybars, Koni shocks and G50-15 Radial T/A's got him the kind of handling he wanted; wheel flares were added to cover the wide tires. The engine was magnafluxed and balanced. TRW pistons, 351 W heads, Sig Erson Hi Flow cam, Shelby dual springs, Torquer manifold with 650 double-pumper, Cyclone headers, and Weber clutch were all added. And it was a pretty trick car to start with!



This '70 Corvette was originally Monza red, but when Armand Polverari of Wallingford, Connecticut, bought it, he had something more interesting in mind. With some design pointers from his wife Mary Lou and Wayne Woods of Woody's Custom Auto Painting in Newington, Connecticut (who did the actual painting), he chose Transition Pearl, Candy Apple Red (the stripes) and Candy Royal Blue (around the stars). These colors run along the side and in a swath down the hood, roof and trunk. It's a paint scheme with a lot of punch—the spirit of American macho!

This '61 Pontiac Ventura originally came with a 389 tri-power motor, but owner Dan Lappin of Easley, South Carolina, tells us that back in '62 Fireball Roberts put in its Super Duty 421 with D-series Carter 4-barrels and NASCAR-legal cast iron headers. It has 8-lug aluminum wheels, but other than that it looks pretty much stock from the outside. Pretty it is, too—a clean machine from the past.



An expert tells you how to get back in shape!

Our files show that thousands of men want to get back in shape, but don't know how to go about it. We decided to ask an expert, Mike Fretault, leading fitness authority. Here are his answers.

Q. How can I get back in shape?

A. There is only one answer to that: get more exercise.

Q. Won't sports do the trick?

A. Sure, sports are great, provided you practice a "complete" sport like jogging, swimming or rowing a few hours every week. Unfortunately, most men don't have the time or energy for that.

Q. How about calisthenics?

A. Also very good, but even a beginner's program should comprise at least 200 to 300 repetitions. Most men find calisthenics tiring and boring and give up after a few workouts.

Q. Isn't there an easier way?

A. There is one outstanding home training method I use and recommend. It's fast, it's easy and it keeps you interested because during every workout you actually see your strength increasing on the built-in Powermeter gauge.

Q. What's it called?

A. Bullworker® training. It's based on Isometric techniques which have been proven to increase strength three times faster than conventional methods.

Q. How long does it take?

A. The introductory "get back in shape" program requires only 70 seconds of exercise per day. The complete advanced training program takes about 5 minutes.

Q. What kind of results can I expect?

A. After 2 or 3 weeks of introductory training, most men can see an increase in strength of around 10% and measure an extra inch or two of muscle on their shoulders, chest, biceps—and an inch or two less flab around the waist.

Q. But it's hard work, isn't it?

A. Absolutely not. Most men between 15 and 65 in good general health can run through the full program without getting tired. Bullworker training is progressive so you perform better each time, yet the training always seems easy to you.

Q. What can I expect from continued training?

A. The sky's the limit. There are specialized exercises for building-up or trimming down any part of your body you want to: broad, muscular shoulders —bulging biceps, powerful wrists and forearms—a deep, manly chest tapering down to a flat, trim waist—muscular thighs and calves. You can expect strength increases of up to 4% a week; that's 50% in just three months and I have seen many men go on to double and even triple their strength.

Q. How can I find out more about Bullworker?

A. I suggest you write for the Free Booklet in color. It contains complete details about Bullworker training and tells you how you can try a Bullworker for two weeks in your own home without cost or obligation.

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RUBBER RAP
(continued from page 46)

Lippmann and Oblizajek to study what happens *within* the tire patch, point by point, rib by rib. They've shown that the tire patch does not work in unison by any means. The outer ribs may carry a much higher load than the center ones and the load distribution even along a single rib varies widely. Also, various rolling resistance forces keep changing within the rib: this can have considerable effect on traction and tire life.

To gather this kind of information, the tire is rolled on a special carriage which can load and steer it. At a line 13 feet from the end of the runway, a complex of transducers measures the forces and moments in three different axes: vertical, fore-and-aft, and straight across. In other words, they can find out what's happening across a single line of the tire patch. There is also one small pickup with a .020-inch tip. It can be positioned anywhere across the runway to pick up information for a single point on the tire patch. To prevent interference from the runway, all of the sensing devices are mounted on a 6000 pound billet with its own suspension. Three large pipes running along side the structure not only stabilize it, but also store compressed air for the catapult that launches the tires. The 40-foot length of the track allows the tire to roll out and stabilize before the measurements are taken.

Load distribution along the tire patch on a moving tire is very different than that of a tire that's standing still. The tread surface gets out of step with the belts and with the side walls as it passes through the flat tire patch and stress builds up. As a bit of tread first contacts the pavement, forces increase but then actually go to zero and reverse before it's ready to leave the pavement. The forces involved can be quite large, equivalent to those of fairly heavy cornering or braking.

It seems at first that you should be able to take the contact area, multiply it by the tire pressure, and have the exact figure for the load the tire is carrying. But this simple high school physics approach doesn't quite work. Part of the load is carried by the air pressure, but only about 70 percent of it. The rest is supported by the inherent tire stiffness.

In fact, the tire stiffness is one of the causes of differing load from one rib to the next. It's not uncommon to see 80 pounds per square inch at the edges of the tread even though the inflation pressure is 24 psi. When you add rolling loads (the loads caused by the tread deforming and then regaining its

ISKY VALVE TRAIN JEWELS
Beef, Guts & Precision

- CAMSHAFTS . . . from competition only steel billet rollers to the Hi-Lift Hydraulic street cams, ISKY dominates the competition.
- LIFTERS . . . the original anti-pump-up hydraulic racing lifters and the strongest roller tappets on the market today.
- PUSHRODS . . . ISKY lightweight chrome moly tubular pushrods feature precision case hardened ends and have the highest stiffness to mass ratio.
- ROCKER ARMS . . . ISKY'S exclusive Arch-Rib design needle-bearing aluminum and hi-quality ductile iron rockers surpass all others in rigidity, durability and performance.
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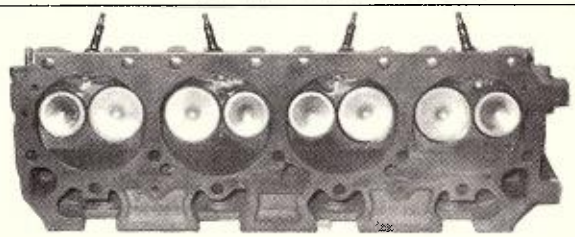

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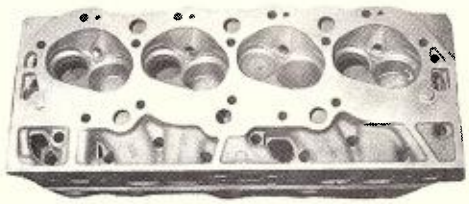

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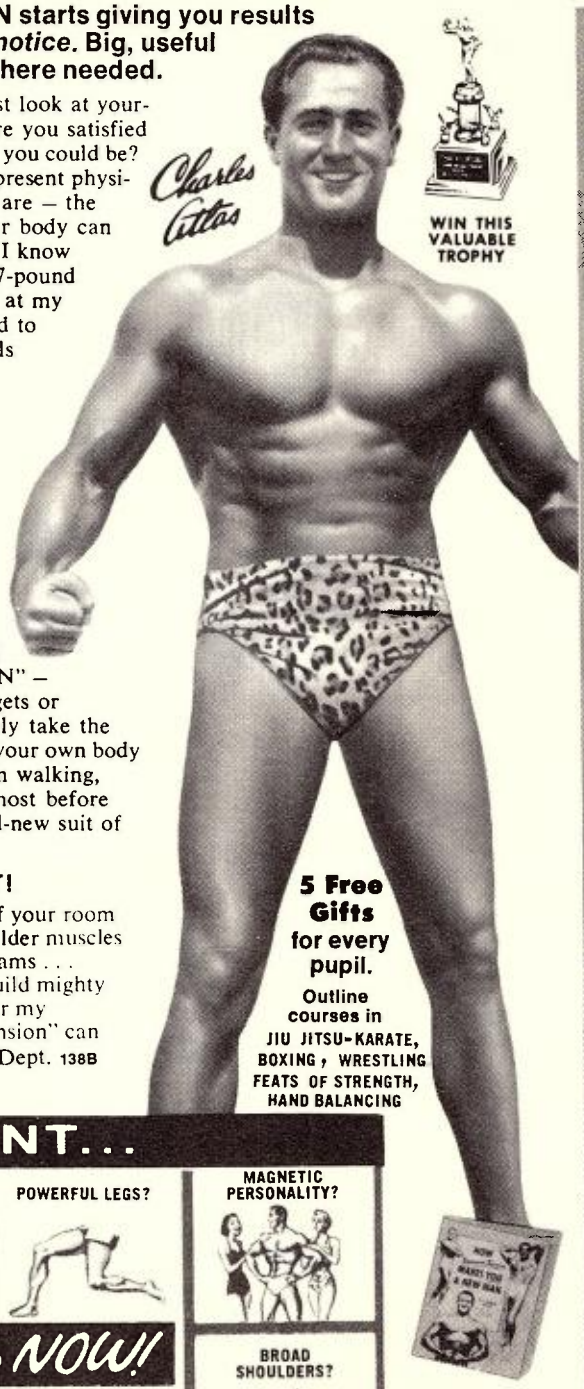

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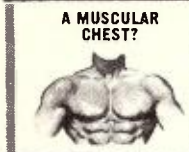

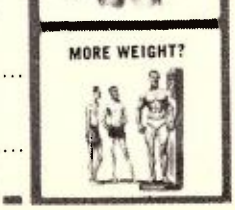

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original shape) the picture gets even more strange looking.

You may have wondered what was happening when instead of leaving a nice wide even streak of rubber on the pavement, your tire put down two stripes at the sides and nothing in the middle. Let out some pressure to regain bite and you may find that the traction gets worse instead of better, because now there is even less pressure to push out the center of the tire. This is particularly common when a tire is mounted on a very wide rim—this tends to suck in the middle of the tread. A wide rim may give improved steering response, but it is not necessarily better for traction: tires are designed for specific rim width and pressures. You can tune to compensate for rim width with tire pressure changes, but if you go too far, the combination winds up out of the ball park.

Uniroyal's machine has been used quite successfully in predicting tire wear and in investigating the mechanics of tire wear. It has confirmed some of the things we already know, in much greater detail—such as the fact that radials are better than bias ply tires, in respect to squirm. Light has been thrown on the self-aligning torque of a tire which is what racers are improving when they shave part of the tread from a tire for road racing: they get more steering response and a faster steering wheel return.

Uniroyal is of course working on other aspects of tire performance. They have special quiet rooms, for instance, with no outside disturbances to interfere with studies of noises that a tire produces. Information is computer processed repetitively to break down the main frequencies and to analyze what in the tire can be changed to modify the noise. You can't get rid of all of the noise, but you can change it so that it ceases to be identifiable and disturbing. Test cars are also used, going out with two people: one to drive and one to man the recording instruments. Here, too, computer analysis of the noise spectrum is used to home in on disturbing noises, because tire noise is really not one noise but hundreds of noises all blended together. And often the loudest components are not the most disturbing; sometimes it takes quite a bit of detective work to find the particular part of the sound which annoys, so it can be cured.

Acceptable noise levels depend on the purpose of the car and its tires. Compared to quiet freeway driving, setups for driving on snow and mud will have higher noise levels because of the more aggressive design. Of course government regulators had to have a hand in determining tire noise levels. The first proposals were sensi-

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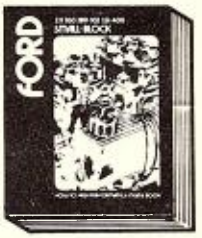
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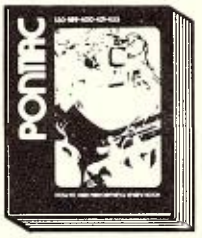
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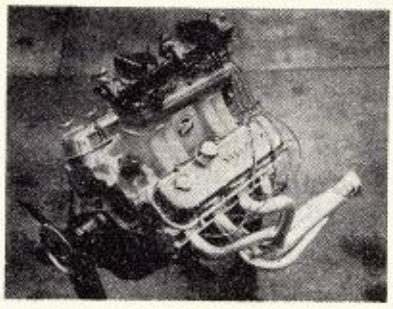

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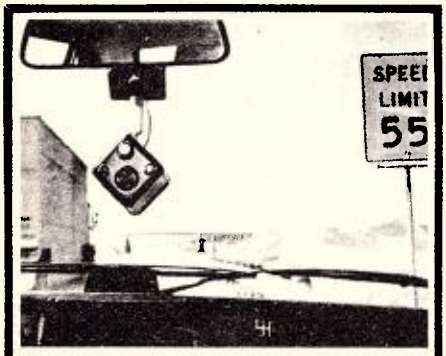

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ble, but some of the more recent noise level requirements are pretty unreasonable.

Any tire, even though it is built with the use of sophisticated machines, requires a sizeable amount of hand labor and calls for considerable human skill in putting it together. Suppose you build a perfectly round tire, mount it on a spindle and prove with a dial indicator that there is now runout either radially or from side to side. Then it is put on a car and starts doing weird things like running out, or feeling out of balance when it really isn't. There are many hidden factors which can go wrong during the tire's construction. The belt alignments, the angles at which the fabric is oriented, are all critical; each change of cord angle could generate pull in one direction or another. The strips of material which make up the tire have the ends skived or beveled with a sharp knife to form a splice and each splice is a potential source of disturbance. You can tell just by inspection or even with X-rays. When the tire is put under load, errors in these areas cause changes in the forces that the tire generates at the road surface.

In trying to sort out the strange variations in tires, Jacques Bajer designed the uniformity machine which we mentioned earlier in the story. In its simplest format, it consists of a force sensing drum mounted on a spindle and fitted with transducers or detectors that read out forces which the tire generates radially, laterally and tangentially. These forces should remain uniform, but in actual practice they vary from tire to tire no matter how carefully they are built. The trick is to see if the particular tires fall within acceptable limits. Uniformity machines of the kind that Jacques Bajer originally designed and patented are not used, with many embellishments and computerized controls, by all tire manufacturers.

The uniformity machine at Uniroyal has a photo cell facing a wheel with 200 teeth which rotates with the tire as part of the spindle. Pulses thus fed into the computer establish the exact location of any disturbance of change in force. At the same time, other photo cells detect the location on the tire of various major plant operations—for instance, how the tire was oriented in the press or how it was positioned during the first and second stage of assembly. This information is checked against the points of force runout to see if they correlate. This makes it possible to keep close control over production.

Tire making has always been an art and a skill. The surprising thing is that it is even more so after all the latest scientific developments. When design, testing and building are all done, some sharp chassis and tire development engineer still has to go out and ride the finished product to give it the final evaluation with his very own seat-of-the-pants meter.

MIDNIGHT SPECIAL
(continued from page 49)

For more efficient oiling, an 8-quart pan replaced the stock unit.

An L-88 clutch transfers the power to a Muncie M-22 rock crusher and back to the Camaro rear—which is fitted with 4.11 posi gears. The ever-present Hurst Competition-Plus shifter stirs the gears. Wheels are Appliance aluminum at the rear, mounting meaty 10-inch wide Goodyear L60-15s. The fronts are M/T 14-inch diameter rims with skinnies. Monroe Air shocks hold down the rear. The only work Torretta farmed out was the front end rebuild.

The custom interior was in the car when Torretta bought it. The Brown naugahyde was stitched up by K&M Custom in Queens, New York. Torretta finished off the slick interior with a gauge cluster which includes Sun Oil, amps and water temp gauges, a column mounted tach and a Grant steering wheel. Travelin' music comes from a Craig tape-deck AM-FM unit.

"The car originally cost me $800, which included the finished interior. For parts, the front end job, wheels and tires, I spent an additional $1200. But I also put a lot of time into it. I worked on the car every afternoon after school until dinner time. And after dinner I worked until late at night. It took me from December of 1974 until September of 1976 to get the car this far."

Torretta's Chevy isn't just some bogus show car that actually never sees the light of day. "I use it every day and I've put about 15,000 miles on it since it's been back on the road," he says.

"I'm not into street racing," Torretta says as we pull away from the curb for a short test drive. "I don't like to take it above five grand." But even below that speed the strong Chevy has more than ample power. It's also surprisingly quiet inside—something you don't expect after hearing the burbling exhausts from curbside. The ride is firm but not uncomfortable. For easy, stereo-on cruisin' the "Midnight Special" is as righteous a piece as you're going to find.

Torretta's Nova was more than just a special personal project. It was a learning experience that he hopes to capitalize on later. "I want to be a custom painter and pinstriper, but it's hard to get a name for yourself at first. Right now I'm working out of a small garage doing custom painting, pinstriping and lettering part time."

So, at the ripe old age of 18, John Torretta is in business for himself. He might not always have enough work to keep him busy 40 hours a week right now, but he's making money while learning a trade and the basics of business, at an age when most young men are struggling to figure out just what it is they want to do.

With John Torretta's talent, determination and that great black-and-flamed advertisement, it's hard to imagine his dreams *not* becoming a reality.

QUICK TAKE

(continued from page 60)

the crankcase, especially at high revs where the piston rings tend to float and flutter. You can't have this in a high-performance engine.

If your block needs re-boring be sure to have it done by a reputable shop. You can goof this up easy if alignment is not right. Most competition engines today are bored with a special plate bolted to the top deck that compensates for any bore distortion caused by torquing up the head bolts. This is a good idea if your boring shop has the facilities. But it's not necessary on the average street engine. Just do a good job of routine boring.

If your block is bored you will need oversize pistons. These are available for all popular engines, either from the factory or aftermarket, in oversizes usually up to .050 over. If you have to buy new pistons, take advantage and get a good set of forged pistons with domes for about an 11-to-1 compression ratio. Make sure they are close to stock piston weight, so you won't need to have the engine re-balanced.

Is there a chance the pistons would be excessively worn, even if the cylinder bores are not? Very unlikely. The two go together—and, in fact, very often the bores are worn much more than the pistons. And of course, if neither the pistons nor bores are excessively worn, you should at least replace the piston rings before buttoning the engine back up. A set of rings is relatively inexpensive and a new set will always reduce cylinder leakage some—even in a new, fresh engine. It would be foolish to tear an engine down and put it together without replacing the piston rings.

The same goes for the main and rod bearings. A new set is relatively inexpensive, and they should always be replaced when dis-assembling an engine. In fact this is a chance to get stronger, longer-lived bearings in the engine. We usually recommend replacing factory bearings with some special aftermarket heavy-duty type—like the well-known TRW Clevite 77 tri-metal type. These can take bearing pressures up to 10,000 psi, and are cheap insurance for any high-performance bottom end.

A bigger problem is whether to grind the crankshaft journals and use undersize bearings. The grinding process is a fairly expensive job, and you want to be sure it needs to be done. (Though there is no additional cost for undersize bearings.)

Most engine authorities put a limit of about .002-inch on taper and out-of-round for both rod and main journals, for street engines. In other words, if the diameter at one end of the journal is more than .002 difference from the other end, or if the diameters measured at right angles are over this difference, better have the journals reground undersize. In the rare case where the journals are worn evenly—no appreciable taper or out-of-round, but just worn to a smaller diameter, you can also consider .002 inch as the practical wear limit. Compare the actual diameter with factory spec tolerance.

You might consider this .002-inch as an unreasonably small wear tolerance on crank journals. But you have to remember that any taper on the journal gives excessive rubbing pressure at one end of the bearing. And any out-of-round gives a pounding effect that increases the wear in an egg-shaped pattern. Things go from bad to worse in a hurry, especially in a high-revving engine. In fact, competition engines can't stand much more than .001 wear tolerance.

There are certain components that should probably always be replaced when tearing down an engine in addition to the bearings and piston rings. These are parts that are relatively inexpensive, and are subject to relatively fast wear or deterioration. I don't think any street engine should go back together without at least a little hotter camshaft. You can buy hot camshafts for as little as $30. Or better yet, get a complete kit that includes the shaft, special hi-rev hyraulic lifters, and a set of compatible valve springs that have the necessary tension to give the high revs. Lifters should always be replaced when a new cam is installed, and valve springs can get "tired" in a few-thousand miles. And when you're replacing the camshaft get a new timing chain. Chains stretch and cause scatter in both cam and ignition timing. And when you check the timing chain, check the sprockets for wear.

Follow the rules and your engine will give you many miles of pleasure.

GM'S PRESSURE COOKERS

(continued from page 25)

Charles Sarle, one of the Schwitzer engineers, took time out to explain to us about the 2 LD Schwitzer turbo with a divided turbine housing used in this application. Most of the exhaust energy available to power a turbo is in the form of a pulse of pressure, just as the exhaust valve first opens. That pulse is like a hammer blow and if you let it dissipate itself without being put to useful work, you have lost nearly all the available power, especially at the low end. A plenum type exhaust manifold with right angle corners loses the pulses and doesn't deliver the power. You can't always blame the turbo—the problem begins with the guy who didn't know how to design the manifold. Tube headers are a very good way to deliver pulses and headers that are divided into separate groups, particularly on a 4 cylinder engine, do an even better job. To keep the pulses divided all the way down the line, the turbine housing is fitted with a center wall that gives a noticeable performance improvement. Incidentally, tuned headers make it

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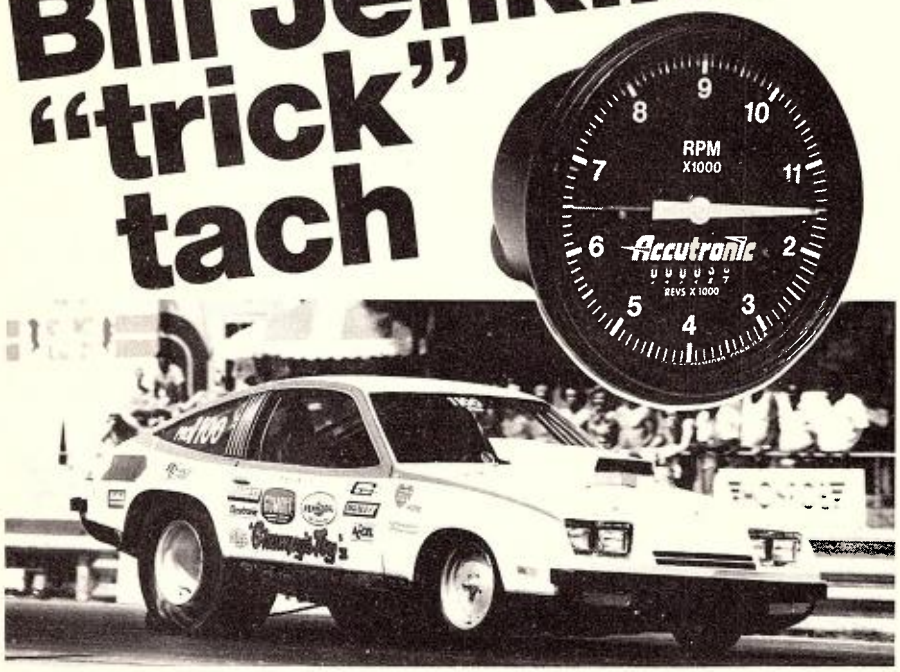

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Schwitzer also cooperated with Pontiac on their 2.5-liter four turbo installation—and it's rather different, to say the least, The 2LM turbocharger is mounted low down and out of the way; this is important in terms of getting rid of engine compartment heat. A cross-over brings the exhaust from one side of the engine to the other.

The compressor handles air only and the pipe from the compressor outlet to the carburetor helps rather than hinders, because it gets rid of heat. Since it doesn't handle any fuel, its length can't cause any problems. Air under pressure is delivered to the air cleaner housing and so to the carburetor. The carburetor retains its original manifold location, so fuel distribution is good. No waste gate is used, and boost pressures are kept fairly low, in a six to eight pound range. Power increases by a good 50 percent.

An important thing in making the Pontiac driveable is a special boost retard control for the distributor. It was produced in experimental form by Charlie Sarles at Schwitzer: this complicated gadget probably wouldn't be quite the same in production, but it delivers the goods. A spring holds a piston in the upper part of the bore against the boost retard pressure. When the boost is high enough, the piston is pushed down and retards the spark. There are stops at each end to adjust the total motion. Built into the inside of the position is a vacuum control can which moves with it and carries the rod that links the diaphragm to the distributor. At part throttle, the diaphragm of the vacuum control pulls on the rod, just as on a conventional distributor. At full throttle, but before the boost comes on, the rod is simply extended, but there is no retard action since the piston is still at the outer part of its stroke. When the boost pressure comes on, the piston and the vacuum move as an assembly to retard the spark.

So GM has come up with three very different installations, each tuned for a particular purpose, and each quite successful. From what we are able to gather, Buick is planning a street package which is not yet finalized; and there will undoubtedly be others before the year is out. It looks like this is going to be the year of the turbo.

TURBO TIPS

(continued from page 24)

but they are the first cabin way to go. Another boost pressure control consists of a somewhat larger turbine

housing with a muffler that limits the maximum exhaust flow. Here, you don't get quite as much bottom end and the top end power is now limited by the back pressure of the muffler. It's less effective but saves a costly waste gate.

A third way to control boost pressure is to use some form of control on the compressor's output, either downstream of the compressor or at its inlet. It works by making the compressor more inefficient, wasting energy and producing more heat. Some of the boost controls on the compressor tend to come on at the wrong time, keeping you from getting top power. On the other hand, the controls on the compressor side operate at a much lower temperature than a waste gate and are therefore less expensive.

The engine has a specific spark requirement depending on compression, fuel octane, boost pressure and the general combustion chamber shape. In an effort to cut costs, most of the kits do not retard the spark when the boost pressure comes on. Instead they simply rely on the non-operation of the vacuum advance. Since the engine still won't tolerate any more than the maximum spark, the distributor must be retarded too far for normal operation, which hurts economy. The spark should have a lot of advance at part throttle for good economy, conventional centrifugal advance for normal mid-range operation and retard when the engine is receiving full boost. This retard action should be progressive and related to the boost.

To get this story we have spoken with some of the top people in the business at Buick, Chevy, Pontiac and Schwitzer. We're sure they gave us a straight picture of where it's at, because none of them had axes to grind or products to sell. Most of the producers of turbochargers are primarily in the diesel and aircraft business. (In a diesel, it gives better efficiency and quieter running; in an aircraft, it makes up for high altitude pressure loss.) Turbocharger makers also produce aircraft support equipment for pressurizing cabins and air conditioning. For them, the automobile dollar is relatively small. There has been no original equipment business, and the aftermarket business has been too small and too spread out for the turbocharger manufacturers to bother with on a full scale.

Turbo-charging has also suffered from the attitude and approach of the purchasers. A guy can easily spend 2000 dollars on a street engine and not have that much more to show for his money. He could spend 5000 dollars on a race engine and really not be that competitive on a national scale. Why then do people expect a turbocharger kit which gives you a 50 or a 60 percent power boost to be sold for under 700 dollars? You either buy a Chevette or you buy a Seville, but don't expect to get Seville luxury in a Chevette: you get what you pay for. A realistic turbocharger installation must have forged low compression pistons, a well matched turbo; it should have a waste gate and must have a boost retard. Anything else is slightly less than a full total.

The best chance of acquiring this, complete with financing and insurance, is from a new car maker. The next most likely source would be a kit that's developed all the way through—and of course it would sell for a correspondingly substantial price.

MATCH BOX

(continued from page 33)

not without its problems. Dave tried at first to tow it with a standard bumper hitch. Because this setup puts all of the tongue weight of the trailer directly on the bumper, Dave wound up with a situation where the trailer looked like a diving submarine and the only thing he could see out of the tow van was sky. It also made the handling characteristics of the combination horrendous.

To solve the problem, Dave knew he would have to use an equalizer hitch made for towing heavy trailers. This setup has the hitch mount bolted or welded under the chassis of the tow vehicle where it puts the load on the frame and not on the bumper. The equalizer tow bar that goes on the trailer has a torsion-bar setup that pushes up against the downward push of the weight of the trailer.

But still there were problems. All of the hitch mounts that go on the tow vehicle Dave found blocked one or another of the vital components. With one of these hitches welded on, he wouldn't be able to remove the spare tire. Others blocked the gas tank. Still others wouldn't fit at all.

Dave's problems were solved when he heard about a new type of hitch receiver being made by Wood's Welding in North Bay, Onario, Canada. Len Wood, the owner, had developed this hitch to solve mounting problems of other hitches. Wood's setup has adjustable arms that allow the hitch to mount on almost any vehicle without blocking anything. On the trailer, Dave installed a General equalizer hitch made by General Hitch of Canada, Ltd., in Ridgetown, Ontario. The price was $43.

Dave Paige says that his trailer now tows like it wasn't there. Last summer he made the trip from Canada to the big van meet in Bowling Green, Kentucky, and he says the trip was no

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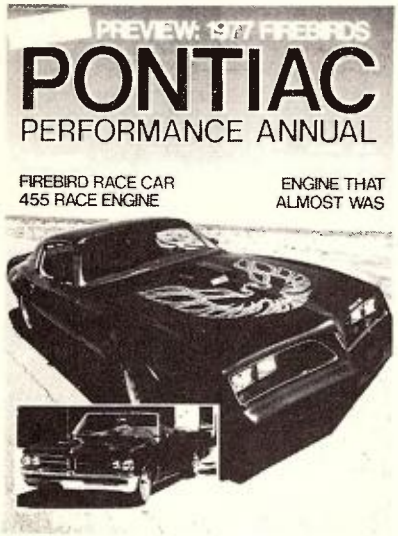

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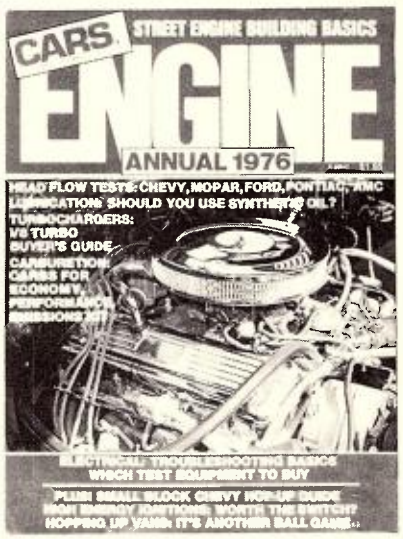

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sweat at all. At up to 80 mph, the trailer towed flat and smooth.

Towing the trailer cut two miles per gallon off Dave's gas mileage, which isn't much at all. Try towing *your* bedroom around for that little!

NASH THRASH

(continued from page 59)

300-350 hp potential from the late 304 block—with safe revs to 6500 rpm, using readily-available specialty cam and valvetrain equipment. If you want to build a sleeper, American Motors probably has got the car for you.

BIG SIX

(continued from page 53)

once you've left them eating your dust and wondering "who was that masked man" you can ease back, drop the shifter into overdrive and watch the gas stations roll on by. If having the world's best secret super-sleeper, street-sweeper doesn't wow 'em at the drive-in, better take up something else. May we suggest tap dancing?

NEWS AND INFO

(continued from page 20)

terested. "I think we all could do more, the racers and the sanctioning bodies, to promote the sport," he says. "I try to put a little something back into drag racing this way, but I think we all could do a little more."

Bob Glidden is somewhat of a rarity. On and off the strip, he's mostly work and little play; but he's far from being dull.

IDENTICAR DETERS THEFTS

Identicar Corporation of America has announced a unique new method of permanently identifying any car or vehicle by etching a computer-coded serial mark on all the windows and other parts of the owner's car.

Gregory Peck, the young Australian president of Identicar, said the code cannot be removed from the glass by any means. In order to steal a car for resale, continued Peck, a thief would have to replace not only the windshield, but all the glass and similarly remove the code from all other parts of the car that were similarly marked for identification. Simply speaking, says Peck, the car is then just not a profitable one to have taken in the first place.

As opposed to burglar alarms, kill-switches and other systems, the Identicar coding cannot be bypassed. The entire concept is a deterrent based on

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C-2

the complete inconvenience and high cost involved which make it totally uneconomic to steal a car protected by Identicar coding.

Identicar Corporation maintains a national registry of all codes and owners and makes this information available to law enforcement agencies throughout the country. In addition to the code, the registry includes all vehicle information including make, model, color and the vehicle identification number among others. While the primary goal of the Identicar system is to avoid theft in the first place, the permanent coding affords extreme ease of identifying a stolen vehicle if an actual theft should take place.

Peck adds that *all* parts of the car can be engraved with the code from engine parts to the CB radio and tape deck. There is no way the car can be disposed of without it being apparent the car is marked.

The coding can be engraved on a car in a matter of minutes by dealers with the special equipment. The system is primarily available through new car dealerships. In fact, many include the serve as a routine part of their dealer preparation.

Peck began by establishing the Identicar system in his native Australia in 1968 and then expanded to New Zealand and Great Britain before coming to the American market in 1976. In Australia, not a *single* car coded by Identicar has been stolen in the 8 years the system has been in use.

For an up-to-date listing of dealers, Identicar Corporation can be reached by calling in the Boston area at area code 617-926-1050.

HUNTINGTON
(continued from page 8)

finding that a lot of cars out in the field don't meet factory emission specs, and a big reason is that many owners are tinkering with the carburetor to get them to run smoother. They richen up the idle fuel mixture, and this causes the HC and CO emissions to go up. Car owners used to get the dealer to do this when they bought the car. But now dealer mechanics are forbidden to tamper with any emission settings. In desperation, the owners are trying to jigger things around in the backyard.

The EPA wants to go right to the root of the problem: Remove all external adjustments from carburetors. No more idle screws or throttle stop screws or accelerator pump adjustments. Have everything sealed in at the factory—and hope it runs right when you buy it!

You'll notice the lawmakers are not proposing a law to forbid you from adjusting your carburetor. They won't tackle John Q. in his own backyard. They can whip the manufacturers and mechanics into line—but they know the public is a different problem. It's easier to make the manufacturer change his product so *you* can't tamper with it.

I GOT AN INTERESTING brochure the other day from a company in Nebraska that is converting various automobile and motorcycle engines for certain types of aircraft that don't require strict powerplant licensing. They use the 400-cubic inch Ford Cleveland engine, the 351 Windsor, the German Ford V4, and the 900-cc Kawasaki Four. They find these engines very practical for small port planes, crop-dusting equipment, etc. They're considerably cheaper than special hand-built aircraft engines, use less gas and last longer. There's more bulk and weight in the powerplant, when you include the radiator cooling system; but this isn't vital on some types of planes—especially when you consider the other benefits. And car engines do offer good performance, when you get rid of all the emission junk, air cleaners and exhaust restriction, as you can for an aircraft engine. The engine can run practically stripped, and produce full gross horsepower. The company advertises 400 hp for their 400-cu.in. Ford engine, with optional 4-barrel carburetor and high-lift camshaft!

It's always fascinating to see a new use for these great Detroit engines we have around us. This is some of the most efficient, economical power in the world.

A SMALL COMPANY in Southfield, Mich., Sterling Technologies, is producing a little electronic module for cars that will sound a buzzer or shut the engine off when certain operating variables get out of whack, like oil pressure, coolant level, transmission fuel temperature, etc. It can monitor six different input channels, producing a signal when the reading goes outside pre-determined limits. Prototype units run about $45, but the company thinks the idea could be incorporated on new cars for a fraction of that.

OLDHAM
(continued from page 6)

stretches of I-495 and I-195 in Massachusetts, I-75 in Florida and I-55, I-70 and I-270 in Illinois. In addition, many highway officials in other states are currently planning motorist-aid systems.

Once a motorist-aid system like Solid State Technology's is installed on every mile of interstate highway in this country, the interstate highway system will truly be the safest, fastest, most useful road system in the world.

PONTIAC
(continued from page 16)

whole Ram Air V engine at any part's counter. What is the part number for this engine and where can I get it? Can I go to my local part's department at the Pontiac dealer or do I have to go to some special place with the part number?

Richard A. Wilson, Jr.
Seattle, Wash.

A. That is a mistake on our part. One of Cars Magazine's *feature writers got a case of wishful thinking and inadvertently put his fantasy on paper. Editor Rich Ceppos, in an effort to make sure this type of thing doesn't happen again, had the whole staff cheer him on as he inserted toothpicks beneath the fingernails of the responsible party.*

EDITOR'S CORNER
(continued from page 4)

tuned carburetor, advanced the timing and installed a set of Koni shocks.

The simple engine modifications transformed our econo-boxes' asthmatic motor and the Koni's improved the suspension so much it's almost impossible to bottom it out now. So you better look out for our little orient express. If we don't surprise you in the straights, we'll get you in the turns.

CHEVY
(continued from page 12)

make it stronger? And would I have any problems with front end alignment control?

If there is anything I have missed in my questions that you can enlighten me on concerning my application, please let me know.

Bill Chandler

A. You should have no problem dropping a big-block Chevy engine into your 1964 Super Sport Chevy. The 1964 came from the factory equipped with a 409-cu.-in. engine so there is adequate room in the engine compartment for a late model big block. The front suspension will easily handle the added weight of the big block with the addition of heavy duty springs.

I would suggest an automatic transmission to minimize breakage in the two-piece driveshaft and a ten-bolt rear. It is very important that the driveshaft angles between the rear, the driveshafts, and the transmission be set to factory specifications. If this precaution is not taken, you may encounter vibrations and damage to the driveline.

Q. I have a '63 split-window Corvette that

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Now!...*Run Your Car Without Spark Plugs...

GET MORE HORSEPOWER, MORE MILES PER GALLON USING ONLY YOUR ORDINARY GAS!

***This revolutionary new invention, installed in less than 15 minutes, is so different it had to be given a brand-new name ... the FIRE INJECTOR. It must give you MORE horsepower, MORE miles per gallon for the life of your car. See unprecedented Guarantee below!**

Your car runs because gasoline is fed into the cylinders where a spark causes it to fire. This action causes the gasoline to explode—this explosion pushes down the pistons. Now, here is the important thing to you. The larger this spark is, the more powerful the explosion. The more powerful the explosion, the more **power** you get from a given amount of gasoline.

Poor explosion means wasted gas, loss of power, poor getaway, bad starting, a sluggish car. A good explosion means more miles per gallon, more horsepower, better pickup, quick starting, an exciting car to drive.

WHAT CONTROLS YOUR ENGINE EFFICIENCY?

Your spark plugs control the efficiency of that explosion. And if they are **borderline** plugs, not only do they give a small spark to begin with, but they get worse every mile you drive. **That** you can see for yourself! Put a new set of spark plugs in your car and then look at them at 100 miles — at 1,000 miles — at 5,000 miles. Every time you look you will see more filth and carbon...more of the electrode burning and eroding away.

Why, some of the new high compression engines can burn up a set of spark plugs in a couple of thousand miles of driving. *Now, you tell me how a weak, inefficient spark from a filthy, burned-out plug can possibly give you the kind of flashing, economical performance you want from your car!*

NEW PLUG OLD PLUG

Spark plug experts admit that plugs only 200 hours old can waste **up to one quart of gas out of every gallon you buy**...that's 25¢ for every $1.00 you spend. And—after only 10,000 miles, they're ready for the garbage!

STOP USING YOUR OLD BORDER-LINE SPARK PLUGS NOW!

Now, read very carefully what I'm going to suggest. I am going to give you the idea to **stop using 10,000-mile spark plugs in your car!** That's right...get rid of them forever! But, you may ask: *"If I get rid of my plugs, what will make my engine run?"*

Well, please remember that if you were told a couple of years ago that your car could run without a carburetor, you simply wouldn't have believed it—yet today you can have gas injection and get more mileage, efficiency and power from less gas—and in a few years gas injection will have replaced carburetors on most cars. In the same way, all you have to do is to replace your old, borderline, inefficient spark plugs with a modern fuel ignition system, and you can do it yourself in 15 minutes if you've never handled a tool in your whole life!

MECHANICS AND ENGINEERS READ THE FOLLOWING CAREFULLY

Now, the new fire injection I am talking about is so inexpensive that it can pay for itself in gasoline savings alone. For the moment, forget about the **extra pep, power** and **performance** that can be in store for you. Forget about the **savings in spark plug servicing and replacement, the savings in wear and tear on pistons and cylinders.** Just remember that *one plug mis-firing in a V-8 engine can cut mileage by as much as* 12%. Just remember that this fire injection system can pay for itself in gas savings.

Let me tell you how:

A spark plugs jumps a spark of electricity across an air gap; this is very wasteful, and limits the size of the spark.

A **fire injector** fires on the surface of a semi-conductive material which delivers a heavy, powerful flame that will not blow out at pressures far greater than those created by high-compression engines!

On borderline spark plugs, the air gap is always getting larger—wasting power and gasoline. Your plugs are constantly accumulating filth and carbon because of inefficient ignition.

A **fire injector** has no air gap to erode away. It will actually outlast your automobile, delivering maximum efficiency without servicing or replacement. There is no wasted gasoline, no loss of power to which you are entitled.

Ordinary spark plugs have to be replaced regularly — or for extra life, you must remove them — clean them — regap and then re-install them.

A **fire injector** is guaranteed for the life of your car - no cleaning, servicing, replacing.

POSITIVE, SCIENTIFIC PROOF!

When you get your set of **Fire Injectors,** here is all you do. If you have automatic transmission — make a note of how fast your car crawls forward when it is in the drive position with the motor idling. If you have a sports car, a racing car or a boat — make a note of the tachometer RPMs when idling.

If you have a regular transmission, put your car in low gear on a level road and notice its speed with the motor idling. Next, take any inexpensive spark plug wrench and remove your spark plugs. You'll never need them again! Just screw your **fire injectors** into the spark plug openings.

✓ CHECK THESE DIFFERENCES!

SPARK PLUG	FIRE INJECTOR
• Fires across air gap	NO air gap to erode away
• Wire electrode burns away	NO wire electrode
• Carbon ruins firing tip	NO tip deterioration
• Needs cleaning & setting	NO cleaning or setting
• Needs periodic replacing	NO replacing
• Spark blows out under pressure	NO blowing out even at highest compression

If you have automatic transmission, now put your car in drive and let your engine idle. If your car stood still with spark plugs, it will now move forward at from 4 to 6 miles per hour; that means the amount of gas that just kept your engine turning over will now carry you **further — faster — cheaper!**

If you have a racing car, sports car or boat, your RPMs will increase up to 200 *more* at idling, up to 300 *more* at high speed.

If you have regular transmission, in low gear and with your motor idling, your car will more forward 4 to 6 miles per hour *faster.* In other words, no matter what you drive, here is **absolute proof** that you can go **further** — go **faster** — go **cheaper** when you have proven **fire injectors** in your car!

ORDER YOUR FIRE INJECTORS NOW!

You can have your set of **Fire Injectors** for the year and model of your car for a fraction of their value, and if they do not deliver maximum performance, you get your money back within 30 days, or **FREE** replacement for as long as you own that car.

GUARANTEE: Use your **Fire Injectors** entirely at our risk ... give them every test you can think of — **power — economy — starting — smoothness — performance,** etc. Then, if you are not completely satisfied at the end of 30 days, simply return them for full refund. We further guarantee **Free Replacement** of any **Fire Injector,** regardless of the reason, for as long as you own your car. Every set of **Fire Injectors** is fully protected by a world-famous insurance company.

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Yes! ... I want to try **Fire Injectors** at your risk. If, at the end of 30 days I am not completely delighted ... if the **Injectors** don't do everything you say, I will simply return them for my money back.

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Car #1 Make_____ Year_____ Model_____ # of Cyls._____

Car #2 Make_____ Year_____ Model_____ # of Cyls._____

Name_____

Address_____

City, State, Zip_____

I'm starting to rebuild into a street-rod, with plans to continue improvements toward making it a show car. The body is in good shape but the frame is rusted through in several places. I was planning on changing the rear-end to a Dana 60 or Chevy 12-bolt while staying with the independent rear suspension. Would it be better, considering my long range plans, to recondition the old frame or get a new one?

Would a '76 Vette frame fit or better yet, is there someone in my area that custom builds frames?

Richard Bostwick
Jackson, Mich.

A. The only frames that are directly interchangeable with your frame are the 1963-1967 Corvette frames. If you find it impossible to locate a used frame or to repair your frame, Chevrolet manufactured a frame assembly for the 63-'67 Corvette under part No. 3900200 which was discontinued in 1974. However, with the popularity of Corvette parts perhaps you can find a Corvette parts collector with one for sale.

Q. I'm rebuilding my stock '70 SS 396/350 hp Chevelle with 3.55 gears and 60's out back. I intend to bore it and install 427/390 pistons, new rod bolts, Torker intake, Holley 7010 and a stock cam and kit. Should I use L-88 rings and will I run into any rebalancing problems? If I unshroud the exhaust valves, how many cc's should be run in the heads to get actual 9-to-1 compression? Are there any other major pieces I should install or substitute for the above that won't sacrifice power or gas mileage with these gears?

Gary Kenaley
LeMars, Iowa

A. The 350 hp, 390-cu.-in. engine is a two-bolt main block which will not safely bore to 4.250 inches for the 427 pistons. A practical overbore in this application would be .060 over. Use O.E.M. Chevrolet rings or high-performance aftermarket rings with a moly top ring.

On any V8 engine when you change the weight of any of the reciprocating components, you change the balance of the engine. If your new pistons are heavier or lighter than your old pistons your engine would then be out of balance. To be on the safe side, I would have the engine assembly rebalanced.

Since you are using a 3.55 gear ratio, any portion of the cylinder head could potentially destroy your low end throttle response. I would stay with the stock port configuration and get a good valve job.

Q. I have a 427-cu.-in., 390 hp, oval port head engine with Holley R-1850 AAS 600-cfm carb, Edelbrock Torker manifold 2740, stock hydraulic cam, headers, Corvair turbo-charger mufflers, TH-400 Trans, B&M shift kit, stock converter, and a 3.08 ten-bolt rear. The car is a '73 Camaro and weighs 3610 lbs.

What jetting and ignition modifications do you recommend? Do I need staggered jetting with this combination? What other modifications do you recommend? The car is for street use only.

Les Nakasato,
Puunene, Hawaii

A. Your 1850 Holley carburetor has 65 primary jets and a 34 BP-2007-9 secondary metering plate. The 65 jets should be fine, but I would try a 34BP-2007-39 secondary metering plate.

Set your distributor curve for 12 degrees BTDC initial advance and 12 degrees distributor advance (24 degrees measured at the crankshaft) for a total advance of 36 degrees at 2500-3000 rpm.

To give your car more low speed performance, I would suggest a 3.42:1 rear and an aftermarket torque converter such as a B&M Holeshot.

MOPAR

(continued from page 15)

engine without having to notch the block. When you rebuild your engine, get the cylinder heads blueprinted and bring them down to 57 cc's and you will have a 10:1 compression ratio. Install a ST-14 Racer Brown cam and kit, 4.10 rear gear and you will have a potent combination.

Q. I puchased a 1966 Plymouth 440-cu. in. engine which I recently tore down for an overhaul. I would like to beef it up for good street action and occasional weekend drags. My local Mopar shop says to go with a 10-10 crankshaft, Crane cam, intake headers, and Holley carb. Is this too much? The only things stock are the block and pistons. Please comment on what type of cam I should use for this "B" block. I want a high rpm, rough idle, but not a full race camshaft.

Kenneth R. Hopkins
North Zulch, Tex.

A. My recommendations for rebuilding your 440 is to put in a set of TRW pistons and set the compression ratio at 10:1. Have the cylinder heads blueprinted and put in a Racer Brown SSH-26 cam and kit. A 10-10 crankshaft is okay but be sure to use Federal Mogul AP bearings. I recommend Hooker headers, a Torker manifold with a 780 cfm Holley carb. Put in a 4.10 rear-end gear. These guide lines should help you get the most performance from your car.

Q. I have a 1974 Plymouth Duster with a 360. I would like to replace the 360 with a 440 Magnum. Does anyone make a kit to do this or can I use factory parts? Would this be worth the trouble or should I try to rebuild the 360?

Lindy Dalton
Quinlan, Tex.

A. You can put a 440 into your "A" body by changing the K frame to No. 2883999. With this K frame you will have some sway bar interference but this can be eliminated on a drag car. Use engine brackets No. 2465862 and No. 2536132. If you want to stay with your 360 you can use the 340 intake valves No. 2863520 which are 2.02-in. in diameter. Then use the Holley Street Dominator manifold and your standard carburetor. Be sure to have the heads blueprinted and brought down to 65 cc's (minus .070 deck and .020 head gasket). On a standard bore this will give you a 10:1 compression ratio. You can do all this with stock components. I recommend the High Performance 340 cam No. 2899206 and valve springs No. 2863439. The whole assembly should be balanced. Use a Speed Pro moly ring combination. This will make your 360 a good competitive street and strip car.

Q. I plan to build a 225 cu.-in. six and install it in a 1969 Barracuda body. Can I get more power out of it by going to low compression, turbocharger and water injection? Or by installing high domes, radical cam, head work, etc? I am going to use a 4-barrel carb and manifold with either setup. I chose this engine because I want to prove to my buddies that you don't have to own a Chevy and V8 to be quick. Any information you can give me would be greatly appreciated. I followed your Dodge Lite project but I wish you had done more engine modifications. Keep up the fantastic work!

Fred McNeal
APO N.Y.

A. I advise that you build your 225 six turbocharged with 8:1 compression ratio. If you do this, a maximum boost of 12 to 15 lbs. is recommended. When you approach the 15-lb. level you will have to water inject the engine. This is a better way to go than dome pistons, radical cam, etc. because the car will idle better for street use and give almost double the horsepower. If you turbocharge the engine go to a forged piston such as Venolia and have the rods upgraded and heavy duty rod bolts installed in the rods. Also look into using a Racer Brown turbocharger camshaft. You will have a pleasant surprise when you start matching yourself against some V8's.

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